A STATISTICAL ANALYSIS OF TERRORISM AND INSTABILITY IN LATIN AMERICA

THESIS

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THESIS

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Preface

The purpose of study was to investigate potential relationships between socio-economic indicators, terrorism and government instability in 15 developing nations in Latin America. Specifically, the goal was to develop a methodology to forecast the trend of terrorism and instability. This capability in conjunction with other indicators could provide warning signals for events that may threaten national interests.

Correlation analysis was used to identify highly correlated socio-economic factors. Also, terrorism data was assessed for patterns. Then, multivariate analysis such as factor analysis and multiple regression was used to evaluate the data and generate the predictive models. Although the methodology was not validated due to insufficient data, the models generally fitted the trend of the historical data fairly well. The work should be continued to increase the accuracy of the models.

This research was performed in support of the International Division of Los Alamos National Laboratory. I wish to thank Mr. Anthony Burris of Los Alamos for providing the original data for this research. I also wish to thank my faculty advisor, Lt Col Kenneth Bauer, for his interest and help throughout this effort. I would also like to thank Dr. Joseph Cain, my reader, for his guidance. Finally, I wish to thank my wife, Tina, and my children, Marsha and Paul, for their understanding and patience during these last six months.

Juan A. Hurtado

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Abstract

In this research the effect of socio-economic factors on terrorism and government instability in Latin America are studied. A commonly held opinion is ·t terrorism and instability are caused by repressive conditions. The objective of this research was to generate a methodology to forecast terrorism and instability given certain socio-economic indicators. This methodology was generated for individual countries, two groups of countries, and a composite developing country. A set of 28 socio- ·nomic factors were evaluated and reduced based on correlation analysis. Patterns of terrorist ·· instability were investigated through data analysis and factor analysis. Multiple regression ·· ·d to develop predictive models. Although autocorrelation was present in most of the models, all terrorism trends except in the individual country models of Paraguay and Venezuela were fairly well fitted by the models. Similar results were observed in modelling the trend of instability generated for Argentina. Data analysis showed that there was a correlation between terrorism and some socio-economic factors. Generally, countries having a relative high level of standard of living experienced less terrorism.

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I. Introduction

1.1 General Issue

The United States has interests in many developing nations around the world. These interests vary depending on the geographical location, economic strength, and political ideology of the country. The instability of these nations is unfavorable not only to regional peace but also to the interests of the U.S. in the region.

Instability can be detected and sometimes predicted by monitoring the state of affairs of foreign governments or regional conditions. Thus, a major advantage could be gained if a reliable methodology could be developed to identify the environment under which unstable events are likely. This capability would enhance our ability to deal with regional conflicts in developing nations.

One approach to develop such a methodology is to take advantage of available data such as socio-economic factors that can potentially be used as indicators to predict instability. This methodology must be reliable, timely and must complement other warning systems such as intelligence gathering.

1.2 Problem Statement

The objective of this research is to determine a methodology to forecast the level of government instability based on socio-economic factors and terrorist activities in developing nations from Latin America.

1.3 Background

The American continent, named after the Italian merchant and explorer Amerigo or Americus Vespucci, is comprised of North, Central and South America (see Figure 1.1).

Central and South America are commonly referred to as Latin America. It was settled by European colonists who spoke languages deriving from Latin, the language of administration, warfare, literature, and trade of the Roman Empire. These languages were Spanish and Portuguese (Wolf and Hansen, 1972:3). Spanish is the dominant language in Latin American countries and is the common language of the countries under study in this research.

Over the course of history, Latin America became part of the third world or developing nations. One question that deserves some attention is: Why has Latin America failed to develop politically and economically as successfully as the United States? Possible reasons are the lack of the following elements in the region (Dostert, 1991:7):

- An expectation of fair and just treatment
- Availability of educational opportunities and health services
- Encouragement of experimentation and criticism
- Matching of skills and jobs
- Rewards for merit and achievement, and
- Stability and continuity

On the other hand, the U.S. has become a world super-power. As such, it has faced challenges and responsibilities around the world. Part of this struggle includes the fighting of the Cold War with the Soviet Union for decades. Now that this struggle is over, our interest in developing countries, where most of the confrontation took place, has shifted emphasis. This interest has decreased in some regions and increased in others.

Figure 1.1. The American Continent

In Latin America, the U.S. still has major interests for political, economic, social and sometimes national security reasons.

Politically, interests range from the preservation of U.S. influence in global affairs to the preservation of regional peace . These interests are very visible when governments are faced with revolutions, insurgencies, religious or militant nationalism (Hayes, 1984:1). For instance, we became extremely interested in Nicaragua and Central America when the Sandinistas, with their socialist tendencies, took over the country and threatened democracy in the region.

Economic interests include protection of loans, investments and trade markets. A major concern is the debt Latin American nations owe to the banking system of this country. A default on this debt could bring about a major strain on the banking system. This situation is worsening, as U.S. banks have been loaning money to these nations since 1984 to allow them to pay the interest back on loans which were past due (Dostert, 1991:1-3). Further, Latin American countries provide a tremendous industrial base for the production and consumption of U.S. products. It is obvious then that any interruption to this economic interface poses a problem to our national interests.

Another area of interest is the social impact of the widespread introduction of cocaine into this country from Latin America. The tremendous economic depression of countries like Bolivia, encourage the cultivation and trafficking of cocaine to reap huge profits. In fact, the cocaine trail that includes Panama, Colombia, Ecuador, Peru and Bolivia present a major challenge to this nation in the drug war.

National security is another area of major interest in Latin America. Although there is no direct threat to our nation, Central and South America provide major supply routes, and availability of facilities for global war contingencies (Hayes, 1984:219).

Despite these interests, the relations between the U.S. and Latin America have not been the best possible. These relations have passed through five distinct periods: 1820-1880 when relations were minimal; 1880-1930, the era of imperialism and "big stick" policy; 1930-1945 the "Good

Neighbor" policy; 1945-1959, the Cold War, anti-communism and benign neglect; and 1959-1980s, when there was a lot of pre-occupation with increasing socialist influence in the western hemisphere. It is worth noting that relations in 1990s could begin yet another distinct era of mutual cooperation (Dostert, 1991:18 21).

Since 1880 the political stability and economic progress in Latin America has coincided with the emergence of U.S. expansionism. At that time, Latin Americans had began viewing the U.S. as powerful nation intent in dominating the entire continent. Then, a series of acts such as the occupation of Puerto Rico and the Phillipines, the intervention in Cuban affairs, the acquisition of the Panama Canal, the landings of American Marines in countries like Haiti, the Dominican Republic and Nicaragua, to protect or consolidate U.S. interests, etc. created an image of imperialism and an increasing feeling of anti-Americanism. By the 1920s, in light of Latin American bitterness and the hero-status of guerrilla leader A. Sandino, who was fighting the Marines in Nicaragua, the U.S. was influenced to reconsider the big stick policy in favor of the Good Neighbor Policy instituted by President Roosevelt.

From the 1930s until about 1945, such relations improved considerably, spearheaded by economic recovery, better trade agreements, etc. After the end of World War II, relations declined once again. At the time that the U.S. shifted its attention to meet the socialist challenge worldwide, Latin America began experiencing social problems, unstable economies, populist movements, etc. In addition, the U.S. support for anti-communist dictators in the region caused resentment in the Latin American communities. In fact, populist movements successfully overthrew some of these leaders - Batista in Cuba, Peron in Argentina, and others in Bolivia, Peru, Colombia and Venezuela.

Ironically, the overthrown of Batista in Cuba created an entire new situation in Latin America. Cuba, under Fidel Castro, has been one of the major supporters of terrorism in Latin America. The goal of the socialist leader has been the eradication of the U.S. presence in the region in lieu

of socialist domination. However, with the recent dissolution of the Soviet Union and the aging of the Cuban leader, it is very difficult to predict the course of the intervention of Cuba in Latin American socialist activities.

Since 1959, the U.S. has provided significant aid to local governments to fight the leftist guerrillas. Although Latin American armies defeated most of these groups, the price paid was very high -Democracy. Victories were usually followed by military coups or ruling juntas. Examples include Uruguay, Chile, Argentina, etc.

What the new relations might be is an interesting subject of discussion. Needless to say, these relations will have an impact on the state of affairs of each nation in Latin America and is bound to affect the root causes of terrorism in the region -injustice, oppression, foreign intervention, human right abuses, economic crisis, etc (Elliot and Gibson, 1978:40-50).

Since, it is clear that the U.S. interests could be threatened by unstable events in Latin America; it is important that research be conducted to develop a reliable warning system. This system could forecast the likelihood of terrorism and instability based on the trend of terrorist activities, enduring economic depression, social unrests, military conflict, political turmoil, etc.

This research will investigate a methodology to predict terrorism and instability based on socio-economic factors. It is important to point out that this effort will concentrate in developing mathematical models using historical data. However, the analyst using this methodology must also consider other indicators or warning signals to properly assess the trends in a particular country or region.

1.4 Previous Related Work

Wisnowski (1990) performed related research in this area. He examined the relationships between several economic time series and an aggregate instability index for developing nations.

His work was limited to two unnamed countries and included data from 1980 to 1989. The majority of his effort was spent in determining appropriate sources for both the independent (economic indicators) and dependent (instability) variables for analysis. His classification of the economic series paralleled the U.S. economic indicators of the business cycle. The series were classified as leading, lagging, coincident, or unrelated to the instability index. Graphical and cross-correlation analysis were used to determine the type and strength of these relationships.

The causal models (models that exploit the relationship between a time series of interest, i.e. instability, and one or more other time series, i.e. economic series) employed were: regression, logit, cluster, and factor analysis. Regression analysis using both principal components and relative change values from the previous period was used to see if a subset of the economic series was statistically significant when regressed against the instability index. Logit analysis was used to map a probability of instability given the economic input. Cluster analysis was used to see if the groups of quarterly economic observations had any significant relationship to the instability index. Factor analysis was used to assess dimensionality and to determine if certain factors could be associated with instability based on factor scores and factor loadings.

His results indicated that there is no combination or single economic series that could be conclusively labeled an indicator of unstable conditions. His models and analysis showed there were relationships between an aggregate instability index and selected economic series, but there was not enough consistency over all techniques to conclude specific series will always be associated the same way with respect to the instability level.

His recommendations for further research range from extending the proposed methodology to exploring other techniques such as chaos theory.

1.5 Desired Outcome

The objective of this research is to develop working models to predict trends of terrorism and government instability. Several factors may affect this objective. For instance,

- The definition of instability is subjective. Generally, instability represents the aggregate of political, economic, military, and social turmoil. However, there are no concrete rules to assign a value to instability levels.
- Socio-economics only represent a part of the dynamics when attempting to label the state of a government.
- Specific knowledge of what data is being collected by monitoring agencies is a major lacking factor. This information could have an impact on the models developed and their accuracy.
- The reliability of data pertaining to terrorist activities is unknown. Many times, it is difficult to assess the actual intent, magnitude and responsible parties of terrorist events. In this research it is assumed that the data provided represents a reasonable description of unstable events.
- Other factors include the impact of other variables such as external intervention, natural disasters, unpredictable human behavior, etc. and are not directly considered in this research.

1.6 Scope

Due to time and data availability constraints, the scope of this effort will be limited to investigate the data provided by Mr. Anthony B. Burris of the International Technology Division, Los Alamos National Laboratory.

This data consists of socio-economic factors, a yearly count of terrorist incidents, and instability assessments for 15 countries in Latin America. These countries are listed in Table 1.1. This

research will not attempt to validate the data. Rather, the majority of the work will concentrate in applying analytical techniques to develop adequate forecasting models.

Table 1.1. Countries

Abbreviation	Country
AR	Argentina
BO	Bolivia
CH	Chile
CO	Colombia
CR	Costa Rica
EC	Ecuador
ES	El Salvador
GU	Guatemala
HO	Honduras
NI	Nicaragua
PA	Paraguay
PE	Peru
PN	Panama
UR	Uruguay
VE	Venezuela

1.7 Methodology

The basic methodology includes applying statistical techniques such as multivariate analysis to reduce the dimensionality of the data and regression techniques to develop the forecasting models. An assessment of the adequacy of the models will be performed through analysis of the residuals (the difference between the actual and the predicted values). Finally, conclusions will be drawn based on the statistical analysis performed and insight gained in the process.

II. Literature Review

2.1 Introduction

This section is devoted to the review of applicable socio-economic factors, terrorism, instability, and statistics. First, a description of the socio-economic factors used as inputs for our forecasting methodology will be provided. Under terrorism, a brief review of terrorism as it applies to Latin America, including a listing of the major terrorist groups per country will be provided. Also, some basic insights in instability and appropriate statistical concepts will be discussed.

2.2 Socio-Economic Factors

In this research we shall use socio-economic factors as our inputs or independent variables. These factors were selected by the sponsor and the actual data was generated from several sources, including the Statistical Abstract of Latin America. Table 3.1 in Chapter 3 lists all the socio-economic factors under consideration.

These socio-economic factors provide some information of the overall social and economic status of the governments under study and their people. Prior to making judgements about these conditions or, more importantly, about the reactions of each population to these conditions, it is appropriate to briefly review some of the socio-economic history and development of Latin America.

Although there are substantial differences among the countries in Latin America, it is reasonable to refer to them as a group when dealing with a broad review of socio-economics in the region (Morgan and others, 1963:2).

Latin America has been plagued by a narrow distribution of land ownership since the colonial period of the 1600s. Such ownership brought not only wealth (from agriculture and mining profits) but also status. From these owners came many of the civilian leaders, army officers, and high church officials. Very quickly a marked difference between the poor (usually the Indians) and the

very wealthy was created in Latin America. This difference was based on economics rather than on race and still continues as a broad middle class in the region is still developing.

Independence in the nineteenth century did not bring about major changes in the landholdings or social classes established. Around this time new trends in economic development began affecting Latin America as well as the world. The application of technology to transportation created cheap and effective means of international trade. This created a chain reaction of expansionism of the domestic market in areas such as communication, service industries, etc. The expanding market economy brought about a continuation of the system of large landholdings in the region. This system required the use of cheap labor which was provided by native Indians.

Latin America failed to take advantage of the opportunities which technical improvements and an expanding world economy provided for achieving a higher standard of living. The fundamental barriers to material progress were institutional. Latin America remained a semi-feudal society. The aristocracy remained in control of political and economic affairs (Morgan and others, 1963:5). This privileged class spent much of their time and money abroad, contributing to the capital shortage of their countries. Apart from their land, these individuals showed little interest in domestic investment. In fact, foreign capital was responsible for developing much of the transportation, commerce, and mineral production in Latin American in the 1900s.

These poor conditions of economic development and social isolation still continue at different levels in Latin America. In fact, economic problems such as the limited size of the internal markets, a depressed rural population, limited industry, etc, and social problems such as a marked division in social classes, a small middle class, lack of education opportunities, etc; stemmed from the long, semi-feudal past (Morgan and others, 1963:13). In addition, a large dependence on agriculture and a relatively small industrial base is still predominant in Latin America.

This brief review points out that economic and social injustice of the masses in Latin America date back several hundred years. Therefore, an analysis of this data without considering the deep

rooted feelings, histories of the people of these nations, and the difference in societies and cultures is at best an indicator of possible trends in the region.

2.3 Terrorism

Terrorism can be defined as a violent form of intimidation to create certain conditions that in turn, improve the probability of achieving a given end (Hanle, 1989:104). For our purposes, terrorism will be defined as an aggregate of assassinations, bombings, facility attacks, hijackings and kidnappings.

2.3.1 Categories: Terrorism can be classified in two broad categories: apolitical and political (Hanle, 1989:121-193).

2.3.1.1 Apolitical Terrorism. Apolitical Terrorism occurs when lethal force is applied in a terroristic manner but for nonpolitical ends. There are three main types of apolitical terrorism:

- psychotic: That which develops from abnormal behavior, i.e. Charles Manson.
- criminal: When terror is systematically used for material gain, i.e. murders, extortion, kidnapping, etc.
- mystical: When lethal force is used against a symbolic victim to influence or invoke supernatural powers, i.e. the Hindu thuggee movement of eighteenth century India where thousands were murdered as sacrifices to the goddess Kali.

2.3.1.2 Political Terrorism. Political terrorism occurs when systematic violence takes place for political gain. In broad terms, political terrorism can be classified as:

- Revolutionary: The primary objective is to destabilize and overthrow the incumbent government.

- State: It involves the employment of lethal force by state governments upon their populations for the purpose of weakening or destroying their will to resist. Further, this type of terrorism can be internal or external. Internal state terrorism occurs when a government uses violent force against its own population to repress opposition. External state terrorism occurs when the use of lethal force is used by a state government against a foreign civilian population to weaken or destroy their morale and willingness to support its own government.

This research concentrates on political terrorism. Specifically, the analysis will emphasize trend predictions.

2.3.2 Terrorist Profile. Most revolutionary terrorist groups can be classified into two main types (Harris, 1983:33).

- Nationalist-Separatist: Those groups that represent nations, national minorities, ethnic or racial groups fighting for freedom from what they regard as foreign rule. Examples include IRA, Palestine Liberation Organization (PLO), etc.
- Political ideologists: Those individuals that belong anywhere from the extreme left to the extreme right.

The left wing terrorists seek to overthrow local governments and advance their revolutionary socialist and communist views. Groups in this category include Italy's Red Brigades, Argentina's ERP and Montoneros, and Uruguay's Tupamoros. Young activists in this category usually start out with high ideals and seek to fight social injustices such as poverty, racism, unemployment, etc.

On the other hand, the right-wing terrorists seek the violent overthrow of established democratic governments in favor of ultra-nationalistic dictatorships or police states such as Nazi Germany or fascist Italy. These individuals see democracy as a decadent way of life, and oppose social progress or reform. An example is the Ku Klux Klan.

Terrorist organizations are very difficult to classify because they overlap when classified in the fore-mentioned categories. Charles Russell and Bowman Miller did an extensive study of terrorist traits in 1977 (Harris, 1983:92-96). They gathered data on 340 activists from many countries. The subjects had engaged in terrorist activities in Latin America, Europe, Asia, and the Middle East from 1966 to 1977. Results indicated that terrorists were between 22 and 25 years old, while their leadership was usually much older. They were predominantly male and unmarried. Most urban terrorists are natives or long-term residents of metropolitan areas, particularly the cities where they operate. For instance, about 90 percent of the Argentinian ERP and Montoneros were from Buenos Aires, their primary area of operations. Terrorists had a predominantly middle class or even upper class background. Their parents were often lawyers, doctors, engineers, professors, etc. In almost all cases the parents were politically liberal or even radical. For instance, among the Uruguayan Tupamoros the membership consisted of over 90 percent middle and upper-class individuals. The majority of these activists are quite well educated. In fact, universities are primary places of recruitment. As far as political philosophy is concerned, three basic ideological tendencies prevail: anarchism, Marxism-Leninism, and nationalism. A combination of these ideologies produces the variations of left-extremists terrorists. Finally, about the only psychological rule that seems valid for most terrorists is the obvious one: they are extremely alienated from society.

2.3.3 Financing Terrorism. Conducting terrorism is very expensive. Costs include living expenses, transportation, communications, operations, etc. Sources of funds include terrorist activities such as kidnappings for ransom, bank robberies, support from political and non-political organizations (Harris, 1983:80-82).

2.3.3.1 Fund-Raising. Activities include kidnapping, bank robberies, extortion, etc. Although, kidnapping is sometimes used for political purposes, traditionally it has been the preferred method used by terrorist groups to raise funds. For instance, Argentina's ERP was able to accumulate over $30 million in the mid-70's through a series of kidnappings of executives of

big multinational corporations (Harris, 1983:84). Although the idea of kidnapping businessman developed in Latin American during the early 1970s, it was quickly adopted in Western Europe, the Middle East, and even Asia. During the period 1968 to 1982, about 3,162 individuals have been the subject of terrorist hostage taking worldwide. Countries known for frequent kidnappings are Lebanon, El Salvador, Mexico, Guatemala, Colombia and Ethiopia, where more than a third of all attacks occurred. However, it must be noted that only a small percent of all the abductions result in deaths. For instance, during 1970-1882 (worldwide), only nine percent of those persons taken by terrorist groups were killed. The bulk of these deaths occurred in rescue operations. Also, the majority of these deaths occurred in Latin America (about 85 percent). This region has been the leader in kidnappings, accounting for 65.1 percent of the world total. Europe is a distant second with 21.1 percent of all kidnappings. This statistic may be attributable to the level of terrorist activity and the level of efficiency of the local police and military in Latin America (Jenkins, 1985:15-17). Thus, it is evident that terrorist groups are active in fund raising activities through kidnappings in Latin America.

2.3.3.2 Governments. Governments also contribute to terrorism. Countries that have supported terrorism include governments such as the Soviet Union, Cuba, and Libya among others. This support is not limited to funds but extend as well to training, arms supply, operations planning, etc. The Soviet Union, through Cuba, has maintained a close contact with terrorist groups in the western hemisphere.

It is important to note that since the oil crisis in 1974, countries such as Libya, which reaped huge profits from this crisis, has played a significant role in supporting terrorism worldwide. In 1969, Col Muammar Qadaffi won control of Libya and its vast oil supply and small population of about 2 million people. Qadaffi is an extremely devout Muslim and has imposed the strictest religious orthodoxy on Libya. He has provided funding for both right-wing and left-wing terrorists. For instance, Qadaffi was the main financial support of the Italy-Libya Association (a front for neo-

fascist agitation) while simultaneously funding groups at the opposite end of the political spectrum such as the Baader-Meinhoff of Germany and the IRA. Although there is no visible pattern for his political ideology, it is safe to conclude that he supports a wide spectrum of terrorist ideology. In fact, at one time Libya became the site of the world's largest network of terrorist training camps for both ultra-rightist and ultraleftists activists.

2.3.3.3 Illegal Narcotics. Illegal narcotic operations create extensive political violence and crime in the world, especially in Latin America. Profits reaped from these operations are sometimes used to support rural and urban guerrillas with the express purpose of facilitating the trade by intimidation and corruption and by keeping the army and police away. For instance, in Colombia assassination for hire arrangements have occurred between narcotics dealers and leftists terrorists. In addition, drug production may be a higher motivator than Marxist ideology or religious fundamentalism in some countries. In fact, drug production dominates some economies such as Bolivia. The estimated annual world profits from illegal drug-trafficking are $ 300 billion and there has been an estimated rise of 10 to 15 percent per year and possibly a great deal more than this (Clutterbuck, 1990:84).

The main cocaine trail in Latin America extends to Bolivia, Peru and Colombia. In addition, Panama could also be included in this trail as a money laundering heaven. In these countries, guerrilla movements gain the support of the growers by protecting them from the army. In short, political terrorism is influenced and sometimes financed by drug lords who seek to enhance their trade.

2.3.4 Terrorism in Latin America. Terrorism in Latin America has substantially increased since the late 1970s. Political, economic, social and military turmoil have given rise to insurgencies and terrorism in the region.

Terrorism developed in the late 1950s in countries like Uruguay. At that time, this country was a great example of democracy and prosperity with a large middle class. This was unusual because the region was plagued with repressive military dictatorships and a wide division between the rich and poor.

Starting in 1958, the Uruguayan economy began to collapse. Young individuals mainly from the middle class became extremely conscious of the conditions of the poor. At that time, they began to search for radical solutions such as hijacking trucks carrying food to the cities and distributing it to the poor. The response and support from the farm workers for the radicals was very enthusiastic. News spread and other networks developed. They became known as the Tupamoros (after an Indian Chief and national hero). The new movement was both nationalist and socialist. They were convinced that the nations' problems stemmed mainly from excessive foreign economic influence with the U.S. leading the way. The movement major goals were to drive the American imperialist out and to lay the groundwork for socialism. Although successful for several years, the Tupamoros movement was just about completely broken by the Uruguayan authorities in the early 70s. However, since the early 1970s more terrorist groups have been operational in Latin America than in any other area. A total of 53 such organizations have functioned in 16 nations of that region.

Since the late 1970s, Latin American terrorism generally has been on the rise. Part of this increase may be attributable to the success of the Sandinista movement in Nicaragua. Terrorism in Latin America usually is a warning of the initial phase of an insurgent movement as most activists in this region tend to be highly nationalistic (Terrorist Group Profiles, 1988:74).

Central America

Central American countries under study in this research are Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. Most of the following information on statistics was derived

from the Information Please Almanac, Atlas and Yearbook of 1991; and from the DOD Report, Terrorist Group Profiles.

Costa Rica

This is a country of 19,652 sq mi, a population of 3,000,000 (with an average annual rate of natural increase of 2.5%), and a literacy rate of 93%. It had a gross domestic product of $4.3 billion and a per capita annual income of $1,529 in 1987. Its principal agricultural products are bananas, coffee, sugar cane, rice, corn, and livestock. It has a labor force of 868,300 with 35.1% in industry and commerce. Principal industrial products are processed foods, clothing and textiles, construction materials, and fertilizer. Natural resources include timber, and hydro-power potential. Exports include coffee, bananas, beef, sugar, and cocoa. Imports include manufactured products, machinery, chemicals, foodstuffs, fuels, and fertilizer.

Costa Rica has been one of the most successful democracies in recent years in Latin America. Its army was abolished in 1949 in lieu of a civil guard and a rural guard. No major terrorist groups or terrorist activities are known to exist in this country. In fact, Costa Rica has been very stable in the past few years.

El Salvador

This is a country of 8,260 sq mi, a population of 5,300,000 (with an average annual rate of natural increase of 2.7%), and a literacy rate of 69%. It had a gross domestic product of $4.1 billion and a per capita annual income of $780 in 1988. Its principal agricultural products are corn, coffee, cotton, sugar, rice, sorghum. It has a labor force of 1,700,000 with 16% in manufacturing. Principal industrial products are processed foods, clothing and textiles, and petroleum products. Natural resources include hydro- and geo-thermal power, and crude oil. Exports include coffee, cotton, sugar, and shrimp. Imports include machinery, automotive vehicles, petroleum, foodstuffs, and fertilizer.

For a country of under six million people, El Salvador has suffered horrific casualties from a long running insurgency: 10,000 people were killed in each year in 1980 and 1981 and the total killed in the period 1980-1988 was over 70,000. Initial funding campaigns by various terrorist groups during 1978-1980 accumulated over $40 million from kidnappings. In 1980, 6 Marxist guerrilla groups joined forces in an umbrella National Liberation Front (FMLN). These guerrillas had an army of about 10,000 which was supplied by Cuba and Nicaragua. There were also right wing death squads that took the law into their own hands. Major terrorist groups are:

Clara Elizabeth Ramirez Front (CERF). It was formed in 1983. It has an estimated membership of less than 20 activists. No external sponsors are known. Political objectives include the performance of high visibility acts of urban terrorism to undercut Government efforts to end political violence and erode public support for the Government and to target US citizens involved in supporting the Salvadoran Government. This group is a splinter element of the Popular Liberation Forces (FPL) and it is considered one of the most radical elements in the Salvadoran insurgency movement.

Farabundo Marti National Liberation Front or Frente Farabundo Marti de Liberacion Nacional (FMLN). It was formed in 1980 and has an estimated membership of 7,500. Sponsors are Nicaragua, Cuba, the USSR, and Vietnam. Also, the FMLN has various solidarity and fund raising support groups throughout Latin America, Europe and North America. Political objectives are to create and sustain a war of attrition against the elected government to cause its destruction and replacement by a leftist, pro-Cuban, anti-U.S. state. The FMLN is the umbrella organization for five insurgent groups that loosely share Marxist Leninist ideology and a pro-Cuban/pro-Soviet orientation: the People's Revolutionary Army (ERP), the Farabundo Marti Popular Liberation Forces (FPL), the Armed Forces of National Resistance (FARN), the Revolutionary Party of Central American Workers (PRTC), and the Communist Party of El Salvador's Armed Forces of Liberation (FAL). This alliance was promoted by Cuba in 1980 as a means to create a more effective

insurgent organization and as a prerequisite for Cuban material support. FMLN members are trained routinely at camps in Nicaragua and Cuba.

Guatemala

This is a country of 42,042 sq mi, a population of 9,200,000 (with an average annual rate of natural increase of 3.1%), and a literacy rate of 51%. It had a gross domestic product of $9.6 billion and a per capita annual income of $1,110 in 1987. Its principal agricultural products are corn, beans, coffee, cotton, cattle, sugar, bananas, timber, fruits and vegetables. It has a labor force of 2,500,000 with 14% in manufacturing. Principal industrial products are prepared foods, textiles, construction materials, tires and pharmaceuticals. Natural resources include nickel, timber, shrimp. Exports include coffee, cotton, sugar, fruits and vegetables, bananas. Imports include manufactured products, machinery, transportation equipment, chemicals, fuels. The major terrorist group in this country is the Guatemalan National Revolutionary Unity or Unidad Revolucionaria Nacional de Guatemala (URNG). It was formed in 1982 and has an estimated membership of 1,500 from various groups. The URNG is a loose coalition of three of the major insurgent groups in Guatemala that have used terrorist attacks: the Revolutionary Organization of the People in Arms (ORPA), the Guerrilla Army of the Poor (EGP), and the Rebel Armed Forces (FAR). Cuba is a main sponsor. Political objectives include the unification of guerrillas and revolutionary front organizations and the defeat of the power of national and foreign wealth and install a patriotic, revolutionary, and democratic people's government. URNG groups have ties with various Latin American terrorist organizations and solidarity movements in Latin America, Canada, the US and Europe.

Honduras

This is a country of 43,277 sq mi, a population of 5,100,000 (with an average annual rate of natural increase of 3.1%), and a literacy rate of 56%. It had a gross domestic product of $4 billion and a per capita annual income of $840 in 1987. Its principal agricultural products are bananas, coffee, sugar cane, seafood, citrus, and tobacco. It has a labor force of 1,300,000 with 9%

in manufacturing. Principal industrial products are processed agricultural products, clothing and textiles, and wood products. Natural resources include timber, gold, silver, lead, zinc, antimony. Exports include bananas, coffee, lumber, meat, petroleum products, tobacco, sugar, shrimp, and lobster. Imports include manufactured goods, machinery, transportation equipment, chemicals, and petroleum. Major terrorist groups are:

Cinchoneros Popular Liberation Movement or Movimiento Popular de Liberacion (MPL). It was formed in 1980 and has an estimated membership of under 200. They receive limited support from Cuba and has ties to the Nicaraguan Sandinistas and Salvadoran FMLN. In addition, the MPL raises funds through kidnappings and robbing banks. Political objectives are the overthrow of the government in favor of a socialist regime. The Nicaraguan Sandinistas use their relation with the MPL to apply leverage against the Government of Honduras and to counter U.S. policy initiatives in the region.

Lorenzo Zelaya Popular Revolutionary Forces or Fuerzas Populares Revolucionarias Lorenzo Zelaya (FRP-LZ). It was formed in 1978 and has an estimated membership of 150-300. Sponsors may include Nicaragua and Cuba and has links to the Salvadoran FMLN. Political objectives are to carry out war on U.S. imperialism and its allies in Honduras.

Nicaragua

This is a country of 50,180 sq mi, a population of 3,900,000 (with an average annual rate of natural increase of 3.3%), and a literacy rate of 87%. It had a gross domestic product of $2.1 billion and a per capita annual income of $610 in 1990. Its principal agricultural products are cotton, coffee, sugar cane, rice, corn, beans, and cattle. It has a labor force of 1,086,000 with 13% in industry. Principal industrial products are processed foods, chemicals, metal products, clothing and textiles, beverages, and footware. Natural resources include timber and fisheries. Exports include coffee, cotton, seafood, bananas, food and non-food agricultural products. Imports include machinery, chemicals and pharmaceuticals, transport equipment, clothing, and petroleum.

In this country, Sandinista guerrillas, activists who took their name from General Sandino, a guerrilla leader from the 1920s, were a combination of Marxist and non-Marxist resistance movements against President Somoza. They ousted President Somoza in 1979 with the support of almost all elements of society. The Contras, a resistance movement who opposed the Sandinista government, emerged in 1981. The Contras had a peak strength of about 18,000 in 1984-1985, falling to about 12,000 in 1987. The Contras have conducted raids, ambushed government troops, destroyed the infrastructure, kidnapped and terrorized villagers as the Sandinistas used to do in the 1970s. The total numbers killed in Nicaragua between 1979 and 1987 (after the Sandinistas came to power) exceeded 70,000 and damage to the economy was about $4 billion. Over the period 1981-1986 the USSR provided $500 million in direct military aid to Nicaragua while the Contras received U.S. support.

Panama

This is a country of 29,761 sq mi. a population of 2,400,000 (with an average annual rate of natural increase of 2.2%), and a literacy rate of 90%. It had a gross domestic product of $4.2 billion and a per capita annual income of $1,830 in 1988. Its principal agricultural products are bananas, corn, sugar, rice, and coffee. It has a labor force of 770,472 with 10.5% in manufacturing and mining. Principal industrial products are refined petroleum, and sugar. Natural resources include copper, mahogany, and shrimp. Exports include bananas, refined petroleum, sugar, shrimp, and coffee. Imports include petroleum, manufactured goods, machinery and transportation equipment.

Terrorism has not been a problem in this country. However, this country under the rule of strong-man General Manuel Noriega became an important staging post both for drugs and money laundering.

South America

Countries under study in this region are Argentina, Bolivia, Chile, Ecuador, Paraguay, Peru and Venezuela. The information on each country basic statistics was obtained from the Information

Please Almanac, Atlas and Yearbook of 1991. The DOD Report, Terrorist Group Profiles, provided the information on terrorist groups.

Argentina

Argentina is the second largest country in area in South America. It has 1,072,067 sq mi. The population is approximately 32,300,000 (with an average annual rate of natural increase of 1.3%), and a literacy rate of 94%. It had a gross domestic product of $74.3 billion and a per capita annual income of $2,360 in 1987. Its principal agricultural products are grains, oilseeds, and livestock products. Its labor force in industry is 31% of the total labor force. Principal industrial products are processed foods, motor vehicles, consumer durables, textiles and chemicals. Natural resources include minerals, lead, zinc, tin, copper, iron, manganese, oil, and uranium. Exports include meats, corn, wheat, wool, hides, and industrial products. Imports include machinery, fuel and lubricating oils, iron and steel, and chemical products. The form of government has traditionally been a representative, republican federal system. Currently, no major active terrorist groups are in operation in this country.

Bolivia

This country has an area of about 424,162 sq mi, a population of 7,300,000 (with an average annual rate of natural increase of 2.6%), and a literacy rate of 63%. It had a gross domestic product of $4.6 billion and a per capita annual income of $680 in 1987. Its principal agricultural products are potatoes, corn, rice, sugar cane, bananas and coffee. Labor force in industry is 19% of the total labor force. Principal industrial products are refined petroleum, processed foods, tin, textiles, and clothing. Natural resources include petroleum, natural gas, tin, lead, zinc, copper, tungsten, bismuth, antimony, gold, sulfur, silver, and iron ore. Exports include tin, lead, zinc, silver, antimony, coffee, sugar, cotton, soya beans, leather, citrus, and natural gas. Imports include foodstuffs, chemicals, capital goods, pharmaceuticals, and transport equipment.

Bolivia has been one of the poorest countries in South America. In the 1980s the extreme economic conditions drove many to grow coca in search of profits from the cocaine trade. Bolivia produces an estimated one third of the world's supply of cocaine. Its cocaine trade is officially estimated at $ 3.6 bill (10 times as much as all the legal exports put together). 23,000 Bolivian peasants and their families depend for their livelihood on 60,000 acres of coca cultivation. Most of the Bolivian coca goes to Colombia for processing, though an increasing amount is going out through Paraguay, Brazil and Argentina. It might be worth noting that Bolivia was a testing ground for the revolutionary philosophies of Che Guevara, one of the most notorious terrorists in Latin American history. At this time, no major terrorist groups are known in this country.

Chile

Chile has an area of about 292,132 sq mi, a population of 13,200,000 (with an average annual rate of natural increase of 1.7%), and a literacy rate of 96%. It had a gross domestic product of $19.4 billion and a per capita annual income of $1,520 in 1988. Its principal agricultural products are wheat, corn, sugar beets, vegetables, wine, and livestock. Its labor force in agriculture is 85% of the total labor force. Principal industrial products are processed fish, transportation equipment, iron and steel, pulp, and paper. Natural resources include copper, timber, iron ore, and nitrates. Exports include copper, iron ore, paper and wood products, and fruits. Imports include sugar, wheat, vehicles, petroleum, and capital goods. Terrorist groups include:

Manuel Rodriguez Patriotic Front or Frente Patriotico Manuel Rodriguez (FPMR). It was formed in 1983 and has an estimated membership of 500-1,000. This group is associated with the Chilean Communist Party and probably receives some assistance from Cuba and elsewhere. Political objectives include the downfall of the government through a terrorist campaign to provoke greater government repression and anti-government sentiment.

Movement of the Revolutionary Left or Movimiento de la Izquierda Revolucionaria (MIR). It was formed in 1965 and has an estimated membership of 500. Cuba provides support to this group.

Political objectives are to conduct terrorist actions in an attempt to provoke the government to take repressive measures that will alienate the general public, establish a Marxist state in Chile and to drive the U.S. out of Chile. To help finance its terrorist operations, the MIR has relied increasingly on bank robberies.

Colombia

This country has an area of about 439,405 sq mi, a population of 31,800,000 (with an average annual rate of natural increase of 2%), and a literacy rate of 88%. It had a gross domestic product of $33 billion and a per capita annual income of $1,140 in 1987. Its principal agricultural products are coffee, bananas, rice, corn, sugar cane, cotton, tobacco, and sorghum. It has a labor force of 11,000,000 with 21% in industry. Principal industrial products are textiles, processed foods, beverages, chemicals, and cement. Natural resources include petroleum, natural gas, coal, iron ore, nickel, gold, and silver. Exports include coffee, fuel oil, cotton, and bananas. Imports include machinery, electrical equipment, chemical products, metals and metal products and transportation equipment.

Colombia is the center for the refinement of the coca produced in Bolivia and Peru into cocaine. Although the production of coca in Colombia has steadily increased, from 2,500 metric tons in 1981 to about 18,000 in 1985, Colombia's really big business comes from the refining and marketing of the crops from all 3 countries. Though the price is falling the output is rising. As in Peru, the expansion of the cocaine industry in Colombia was closely linked with the growth of political terrorist movements, especially the two groups FARC and M19. These groups were making no great political impact until the end of the 1970s when they began to raise a levy on peasants growing coca in exchange for protection from the police and military It is only in recent years that terrorism in Colombia has been largely financed by the international drug trade. The murder and kidnap rate both by terrorist and criminals is horrific. Principal terrorist groups are:

The 19th of April Movement or Movimiento 19 de Abril (M-19) was formed in 1970 and has an estimated membership of 1,000. Sponsors include Cuba, Nicaragua, and to a lesser degree, Libya. The M-19 raises funds through kidnappings, and drug related activities. Its political objectives are to conduct an armed struggle against the Colombian bourgeoisie and American imperialism. The M-19 rapidly expanded in 1977 and 1978 and increased in size, capability, and scope of activities as a result of training received from the Argentine Montoneros and Uruguayan Tupamoros as well as in Cuba and possibly Libya. The M-19 reportedly has ties with many active and dormant Latin American terrorist organizations, including the Uruguayan Tupamoros and the Ecuadorian AVC, as well as groups in El Salvador, Costa Rica, Peru, Guatemala, and Venezuela. M-19 guerrillas also are loosely allied with other Colombian groups such as the Popular liberation Army (EPL), the National Liberation Army (ELN), the Patria Libre, and the Workers' Revolutionary Party (PRT) under the National Guerrilla Coordinator (CNG), which excludes the Revolutionary Armed Forces of Colombia (FARC). The M-19 also joined in the Simon Bolivar Guerrilla Coordinator, a FARC-led loose alliance formed in 1987.

The National Liberation Army or Ejercito de Liberacion Nacional (ELN) was formed in 1964 and has an estimated membership of less than 1,000. Cuba may provide some assistance. This group is Pro-Castro, anti-U.S., and Marxist-Leninist and anti-national bourgeoisie. They seek the conquest of power for the popular classes along with nationalizations, expropriations, and agrarian reform. Their main goal is to drive out the foreign oil companies. These companies, however, have largely Colombianized both management and labour, and foreigners maintain a very low profile, keeping their movements unpredictable, when they do visit the oil fields. Therefore most of the attacks are on the installations and not on people.

The Popular Liberation Army or Ejercito Popular de Liberacion (ELP) was formed in 1967 and has an estimated membership of 600-800. No external sponsors are known. Their political

objectives are to emphasize a peasant struggle of Maoist orientation and to conduct a war of liberation directed at the Colombian bourgeoisie.

The Revolutionary Armed Forces of Colombia or Fuerzas Armadas Revolucionarias de Colombia (FARC) was formed in 1966 and has an estimated membership of 4,000-5,000 armed guerrillas in 35-40 fronts. Political objectives include the overthrow of the established order in Colombia and replace it with a leftist and anti-American regime; and to create a broad anti-monopoly and anti-imperialist front and unite left wing parties and organizations into a political movement; and to force U.S. and other imperialist interests out of Colombia. The FARC is probably the largest, best-trained and equipped, and most effective insurgent organization in Colombia and in South America. The FARC has a closer relationship with Colombian narcotics traffickers than do other Colombian insurgent groups. The relationship appears strongest in areas where coca production and FARC operational strong-holds overlap. In local instances, in return for FARC protection of narcotics interests, the guerrillas have received money to purchase weapons and supplies. Money from the narcotics trade supplements FARC revenues from kidnappings, extortion, and robberies.

The Ricardo Franco Front or Frente Ricardo Franco (FRF) was formed in 1984 and has an estimated membership of 100. No sponsors are known. Political objectives include the overthrow of the established order and form a people's government. In 1984, the FRF grew out of FARC dissidents who were displeased with the FARC program and upset by the FARC's agreement to a truce with the Government.

Ecuador

This is a country of 109,484 sq mi, a population of 10,700,000 (with an average annual rate of natural increase of 2.5%), and a literacy rate of 85%. It had a gross domestic product of $9.4 billion and a per capita annual income of $940 in 1986. Its principal agricultural products are bananas, cocoa, coffee, sugar cane, fruits, corn, potatoes, and rice. It has a labor force of 2,800,000 with 13% in manufacturing. Principal industrial products are processed foods, textiles,

fish, and petroleum. Natural resources include petroleum, fish, silver and gold. Exports include petroleum, shrimp, bananas, coffee, cocoa, and fish products. Imports include agricultural and industrial machinery, industrial raw materials, foodstuffs, chemical products, transportation and communication equipment. The major terrorist group is AVC.

The group Alfaro Lives, Damm it! or Alfaro Vive, Carajo (AVC) was formed in 1983 and has an estimated membership of 200-300. Sponsors include the M-19 of Colombia, and probably Cuba, Libya, and Nicaragua. The group favors social reform and opposes oligarchy and imperialism. They create opposition to the current government, especially among the rural poor and seek the withdrawal of U.S. and other foreign interests from Ecuador.

Paraguay

This is a country of 157,047 sq mi, a population of 4,000,000 (with an average annual rate of natural increase of 2.8%), and a literacy rate of 84%. It had a gross domestic product of $7.4 billion and a per capita annual income of $1,740 in 1987. Its principal agricultural products are soybeans, cotton, hides, sweet potatoes, tobacco, corn, rice, and sugar cane. Its labor force is 1,300,000 with 34% in industry and commerce. Principal industrial products are packed meats, crushed oilseeds, beverages, textiles, light consumer goods, and cement. Natural resources include copper, gold and silver, iron ore, coal, timber and fish. Exports include cotton, soybeans, meat products, tobacco, timber, coffee, and hides. Imports include fuels and lubricants, machinery, and motors, motor vehicle, beverages, tobacco, and foodstuffs. No active terrorist groups are currently known.

Peru

This is a country of 496,222 sq mi, a population of 21,900,000 (with an average annual rate of natural increase of 2.4%), and a literacy rate of 80%. It had a gross domestic product of $19.6 billion and a per capita annual income of $920 in 1988. Its principal agricultural products are wheat, potatoes, beans, rice, sugar, cotton, and coffee. It has a labor force of 6,800,000 with 19% in industry. Principal industrial products are processed minerals, fish meals, refined petroleum, and

textiles. Natural resources include silver, gold, iron, copper, fish, petroleum, and timber. Exports include copper, fish products, cotton, sugar, coffee, lead, silver, zinc, wool, oil, and iron ore. Imports include machinery, foodstuffs, chemicals, and pharmaceuticals.

Peru grows 50 per cent of the world's coca plant. It is transported to Colombia where the main processing plants are located. This drug growing crop accounts for about 50 percent of the country's exports. Drug cartels provide support to one of the most fanatical terrorist movements in the world, Sendero Luminoso (SL) or Shining Path.

The Shining Path or Sendero Luminoso (SL) was formed in 1969 and has an estimated membership of 4,000-5,000. No foreign sponsors known. Political objectives include the overthrow of the government in favor of a leftist, ethnic Indian state by the year 2000. The Shining Path is a highly active and violent terrorist group that claims a neo-Maoist orientation. Unlike most other Latin American leftist subversive groups, the SL is not believed to have obvious or extensive ties to Cuba or other sponsors. Bank robberies, extortion and donations from drug lords are the primary sources of funds. The SL has many of its strongest rural bases in the areas where coca is grown. Although it does not get directly involved in the drug trade, the SL still benefits from its cultivation and transportation. Economic disruption by the SL also has targeted the railways in an attempt to cripple the major transportation system. Bombing is a preferred technique, because Peru's mining industry ensures easy availability of stolen explosives and of people trained to use them.

The Tupac Amaru Revolutionary Movement or Movimiento Revolucionario Tupac Amaru (MRTA) was formed in 1983 and has an estimated membership of 100-200. Nicaragua and Cuban provide this group limited support. Also, there appears other ties with some Latin America groups such as the M-19 in Colombia. Its political objectives are the de-stabilization of the Peruvian Government, to force the US government and business activities out of Peru, and to create an

image of MRTA as the Peruvian militant group aligned with Marxist international revolutionary movements and proponents.

Uruguay

This is a country of 68,040 sq mi, a population of 3,000,000 (with an average annual rate of natural increase of 0.8%), and a literacy rate of 96%. It had a gross domestic product of $7.5 billion and a per capita annual income of $2,530 in 1988. Its principal agricultural products are livestock, grains, and sugar. Its labor force is 1,300,000 with 19% in manufacturing. Principal industrial products are processed meats, wool and hides, textiles, shoes, handbags and leather wearing apparel, cement and refined petroleum. Natural resources include hydroelectric power potential. Exports include meat, hides, wool, and textiles. Imports include crude petroleum, transportation equipment, chemicals, machinery and metals. With the eradication of the Tupamoros in the early 70s, no major terrorist group is active or currently known.

Venezuela

This is a country of 352,143 sq mi, a population of 19,600,000 (with an average annual rate of natural increase of 2.3%), and a literacy rate of 88%. It had a gross domestic product of $47.3 billion and a per capita annual income of $2,530 in 1988. Its principal agricultural products are rice, coffee, corn, sugar, bananas, dairy and meat products. It has a labor force of 5,800,000 with 28% in industry. Principal industrial products are refined petroleum products, iron and steel, paper products, cement, textiles and transport equipment. Natural resources include petroleum, natural gas, iron ore, and hydroelectric power. Exports include petroleum, and iron ore. Imports include industrial machinery and equipment, manufactures, chemicals and foodstuffs. A major terrorist group is Red Flag.

The Red Flag or Bandera Roja was formed in 1969 and has an estimated membership of less than 50. It used to be sponsored by Cuba until 1969. Its political objectives are rural revolution and to seek a dictatorship of the proletariat by means of an armed struggle. The Red Flag splintered

from the Venezuelan Movement of the Revolutionary Left (MIR) in 1969, when the Soviet Union decided to pursue diplomatic relations with Venezuela and forced Cuba to abandon support for insurgents there. This group may have ties to two Colombian revolutionary groups, the National Liberation Army and 19th of April Movement.

2.3.4.1 United States Statistics. Table 2.1 provides statistical information on the United States. Thus a comparison with every Latin American nation could be performed on this basis. This comparison provides an indication of the relative conditions of each country under study in this research.

Table 2.1. U.S. Statistics for Comparison

Factor	U.S.
Area	3,540,939 sq mi
Population	251,400,00
Rate of natural increase	0.8% per year
Literacy Rate	96%
Gross Nat Prod	$4,862 billion in 1988
Per Capita Income	$19,800 in 1988
Major Agricult. Products	Corn, Wheat, Barley, Oats, Sugar, Potatoes, Soybeans, Fruits, Beef, Veal, and Pork.
Labor Force	122,000,000
Major Industrial Products	Petroleum Products, Fertilizers, Cement, Pig Iron and Steel, Plastics, Resins, Newsprint, Motor Vehicles, Machinery, Natural Gas, and Electricity.
Natural Resources	Coal, Oil, Water Power, Copper, Gold, Silver, Minerals, and Timber
Exports	Machinery, Chemicals, Aircrafts, Military Equipment, Cereals, Motor Vehicles, and grains.
Imports	Crude and partly Refined Petroleum, Machinery, and Automobiles.

2.4 Instability

Instability could be caused by political turmoil, economic depression, social injustices, etc. In addition, instability may spread from one country to others thus creating regional instability such

as occurred in the 1980s in Central America. At that time, Nicaragua contributed a great deal to the regional instability that faced El Salvador, Honduras and Guatemala.

Political instability in Latin America is caused by a myriad of factors. Some of them include a rapid population growth, i.e. an increase of 86% between 1950 and 1975 in the region, accelerated rates of urbanization, low standard of living conditions, lack of internal order, etc. (Morgan and others, 1963:64-66). Another factor is the role of the military in government. For instance, this region has been plagued by military coups, ruling juntas, etc. The sources of power in these nations such as the government, the military, landed oligarchs, and the church, all share responsibility for the frequent political up-heaval of Latin America.

Economically, Latin American nations are inherently prone to economic distress. One of the major reasons is the tremendous dependence upon limited exports, mainly from agriculture, mining, or oil. Each country relies on one or two major products. Further, these major exports are produced in restricted areas by few enterprises. All this creates serious problems for these economies due to the fluctuations of the markets, instability of the prices, and monopoly of profits (Wolf and Hansen, 1972:4).

Social injustices include the disparity of wealth, lack of opportunities for social up-ward mobility, education, medical care, and the widening gap between the social classes.

Generally, instability can be regarded as a manifestation of the people's desire for a better way of life. It must be noted that most of the terrorism that inflicts Latin America is caused by leftist activists. These terrorists advocate socialism which calls for social equality and similar opportunities for all. This basic appeal has attracted many Latin Americans.

For the purpose of this study, government or regional instability will be classified as pre-instability, instability and post-instability. Our major interest lies in identifying the trends leading to these periods.

2.5 *Statistical Concepts*

Statistics is a branch of mathematics widely used to analyze and interpret quantitative data (Mendenhall and others, 1990:1). In turn, a statistical analysis could be defined as an empirical process designed to evaluate an activity based on the manipulation of data, estimation of parameters (means, variances, etc), testing of hypothesis, and model fitting (or data representation).

The goal of this effort is develop models to forecast terrorists activities and instability based on historical data. Multivariate techniques such as multiple regression and factor analysis will be applied.

The field of multivariate analysis consists of those statistical techniques that consider two or more related random variables as a single entity and attempts to produce an overall result taking the relationship among these variables (i.e. correlation) into account. Multivariate techniques could be used for statistical inference or for exploratory data analysis. In this thesis, we are interested in the second case.

Specifically, regression analysis will be utilized to develop the predictive models. Inputs for these regression models could be the socio-economic factors themselves or some other representative data. Another multivariate technique called factor analysis will be used to generate representative data such as factor scores. Factor analysis will also be used to evaluate any patterns or commonality in the data.

Independent variables, $X_1, X_2, \ldots, X_n$ will be associated with the socio-economic variables or scores. The response or independent variable, Y, will be associated with terrorism or instability.

2.5.1 Regression. Regression analysis is a statistical technique that utilizes the relation between two or more variables so that one variable can be evaluated based on the other or others. Basically, regression can be used for (Neter and others, 1990:23-31).

- Description: When the process can be represented by a regression model.

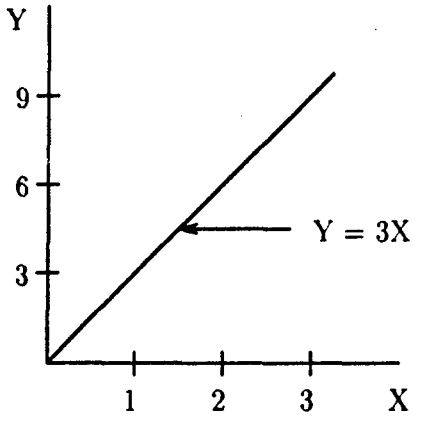


Figure 2.1. Example of Functional Relation

- Control: When a process or system can be managed through the use of a statistical relation between independent variables and a desired response.
- Prediction: When the purpose is to predict a desired response.

During this research, our interest lies in the predictive characteristics of this technique.

Relations between variables could be functional or statistical (Neter and others, 1990:23-26).

1. A functional relation is expressed as $Y = f(X)$. A given a value of X indicates a value of Y based on the function f. Models based on these relations are called deterministic models because there is no error in predicting Y as a function of X. Figure 2.1 shows an example of this relation.

   The model may be represented as:

$$Y = \beta_0 + \beta_1 X$$

2. A statistical relation, unlike the functional relation, is not perfect. Generally, approximations or best estimates are used to indicate the value of Y based on X. Models based on these relations are probabilistic. Figure 2.2 shows an example of this relation,

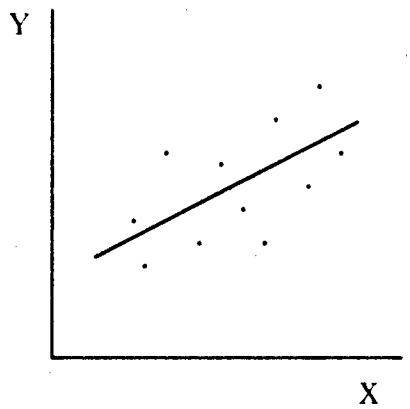


Figure 2.2. Example of Statistical Relation

The model for Figure 2.2 may be represented as:

$$Y = \beta_0 + \beta_1 * X + \epsilon$$

where ϵ represents the error of predictibality.

Regression models are generally used to describe the statistical relations between variables. These type of models will be widely used throughout this research. For simplicity, we will assume that a linear regression function represents the data and activities adequately. This model is our best attempt to approximate Y based on the given independent variables. The basic model for multiple variables is of the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon$$

where Y is a random variable (its value vary on repeated trials for each set of X), the regression coefficients β_s are unknown parameters, the independent variables Xs are known constants, and ϵ is a random variable with mean zero and constant variance.

Therefore, the expected value or best approximation of Y is

$$E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n$$

This expected value indicates our inability to provide an exact model to describe the process. This inability is caused by several factors such as the possible omission of pertinent variables, inexact representation of the statistical relation, etc. However, if the developed models represent the historical process with an acceptable degree the accuracy; then, a useful methodology would have been provided.

Now, we turn our attention to the estimation of the regression coefficients for the multiple (several independent variables) linear regression model adopted. One technique is the Least Squares approach described next.

2.5.1.1 Least Squares. This method estimates the coefficients of any linear model by fitting a straight line to a set of data points (Mendenhall and others, 1990:497). Here, we want the deviations (vertical distances) from the points to the line to be as small as possible. In a sense, we are interested in finding the best line that could be used as an approximating function, even though it might not agree precisely with the data at any point.

The least squares method finds the best approximating line when the error involved is the sum of the squares of the differences between the line and the given points. The goal in this approach is to minimize this error. Figure 2.3 depicts the approximating line and the errors associated with 2 points for this approach,

If Y is the desired response, and E(Y) or expected value of Y is the corresponding point on the line, then the error is given by

$$e = Y_i - E(Y_i)$$

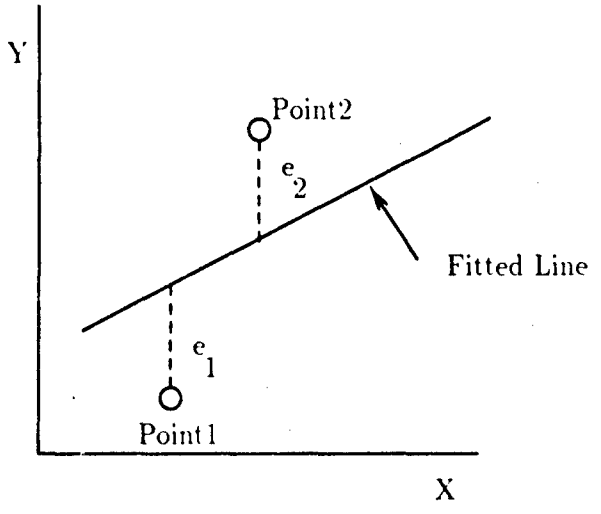


Figure 2.3. Fitting a Straight Line

Then, the sum of squares for error to be minimized is

$$SSE = \sum_{i=1}^{n} (Y_i - E(Y_i))^2$$

SSE could be minimized by taking the partial derivatives with respect to each β, and setting them equal to zero. The solution to these equations yield estimates of the parameters or regression coefficients under investigation.

2.5.2 Factor Analysis. FA is a data reduction technique for investigating interdependencies. Specifically, FA is the study of interrelations among variables in order to find a new, smaller set of variables which express a commonality among the original variables (Jackson, 1991:40).

FA attempts to simplify the relationships among a set of variables by uncovering common dimensions or factors that link together these variables, and consequently provides insight into the underlying structure of the data. It indicates the important common qualities present in the data (Dillon and Goldstein, 1984:53-106).

FA could be applied to exploratory and confirmatory analysis. Exploratory analysis takes place when one lacks a theoretical hypothesis and is searching for a common structure underlying the data. Confirmatory analysis is used when the goal is to statistically evaluate the validity of a given hypothesis.

A factor, f, is a qualitative dimension, a coordinate axis, which defines the way entities differ. Information on how much they differ is provided by factor scores. These scores give the projection of an observation on the factors. In some cases, factor scores can provide additional insight by indicating patterns of common variation.

The basic model is expressed as

$$X = \Lambda * f + \epsilon$$

where

X represents the independent variables

Λ represents unknown constants called factor loadings

f represents unobservable variables called common factors

e represents unobservable variables called unique factors

This model partitions X into two uncorrelated parts:

- A part that is common to all X, $\Lambda * f$. This common part explained by the model has a common variance called the communality of a variable. This communality is the portion of a variable's total variance explained by the common factors.
- A part that is unique to each X, e, called its uniqueness. The uniqueness reflects the unexplained variance of the variable by the common factors.

Factor loadings give the simple correlation between a variable and a factor. They indicate which variables are involved in what factor and to what degree. A comparison of the factor loadings

would identify those variables that are most related to a factor. In some cases, a pattern may emerge from this comparison. This pattern could reveal an underlying relationship among the original variables. Assigning a label to this pattern is largely judgemental. However, it must reflect the combined meaning of the variables that load on each such factor.

Sometimes, it is difficult to identify the pattern formed by the variables. In these cases, rotating the factors may provide an additional insight into the data by attempting to achieve a simple structure. The goal of factor rotation is to make the factors as distinct as possible. For instance, if variable loads high on any factor, it is desirable to have this variable load very low on the remaining factors.

There are two methods of rotation: orthogonal and oblique. Orthogonal rotation requires perpendicularity among the factors after rotation; oblique rotation poses no such restriction and the factor axes can be rotated independently. Selecting one method over the other depends on the goal and preference of the analyst.

2.6 Summary

This review has presented some basic concepts that are fundamental to this research. The general description of the economic development of Latin America provides some insight to the chronic problems facing the region. Also, this review shows that terrorism has a well placed infrastructure (training, networks, resources, etc) in most of the countries in Latin America. If this indeed is the case, then, any effort in eradicating or countering terrorism must make provisions to eliminate such infrastructure. The concept of instability indicates that it is not easy to define or quantify it. As such, this effort will opt to generate an index to represent the concept. Finally, the statistical techniques described will be used in developing the predictive models during this research.

III. Methodology

3.1 Introduction

As described earlier, a problem of this type is very difficult to approach because human behavior is the basic common denominator in our predictors. That is, the way people react to the socio-economic conditions influence the responses under investigation in this research. Nevertheless, if we assume that there is trend or pattern in such behavior, then we can develop models that relate socio-economic factors with terrorism and instability by fitting the historical data.

3.2 Approach

One approach to solve this problem is to consider several models. For instance, a model for each country, each region, and an overall aggregate model could be developed to represent the differences among the Latin American countries and to provide flexibility to the monitoring agencies.

The basic methodology to solve the problem will consist of the following steps:

1. Data Reduction: This step will consist in reducing the number of independent variables.
2. Trends: An effort will be made to assess if the increase of terrorism in Latin America is coincidental with other relevant regional or world-wide events.
3. Country Selection: A review of the material in Chapter 2 reveals several situations in the region. For instance, several countries are largely dependent on the cocaine business; some seem to be related by a violent revolutionary movement; others such as Argentina, Chile and Uruguay seem to have returned to more stable governments after years of turmoil. Finally, countries like Venezuela, Paraguay and Costa Rica exhibit no identifiable pattern. Therefore, models will be developed to address the most distinguishable groupings in Latin America as well as for every country.

4. Country and Terrorism Relationship: An analysis based on terrorist activities and socio-economic factors will be performed to investigate any potential relationship.

5. Factor Analysis: FA will be performed to investigate any underlying structure in the data and to generate factor scores for use in regression analysis.

6. Instability Index: An index will be developed to aid in the estimation of an overall response or trend representing the level of instability.

7. Statistical Models: Linear Regression will be used extensively for model development.

8. Model adequacy: The models generated will be checked for adequacy.

These steps will be discussed in more detail in the following sections.

3.3 Data

Los Alamos National Laboratory provided data for the countries listed in Table 1.1. This data included historical statistics for the socio-economic factors listed in Table 3.1 for the years 1960 through 1987. Further, it also contained yearly statistics for terrorists activities (TER) from 1970 to 1990 that included: assassinations, bombings, facility attacks, hijackings, and kidnappings. Initial assessments of instability were also provided for each country. These assessments were classified in three levels: pre-instability, instability, and post-instability.

3.3.1 Data Reduction. Data reduction will be done in four steps:

1. First, only those years containing statistics for all the factors will be considered.

2. Secondly, variables having missing yearly statistics will be eliminated.

3. Third, variables having correlation coefficients of .85 and higher will be assumed redundant for the purpose of this study. In addition, this will reduce the presence of high inter-correlation among variables in the model. This presence may add little to the model while increasing the

Table 3.1. Socio-Economic Factors

Variable	Description
CAL	Daily Caloric Intake (Calories per day per capita)
CBR	Crude Birth Rate (Number of live births per thousand)
EAP	Economically Active Population (Thousands of persons)
ECD	Per Capita Consumption of Electric Energy (Kilowatt Hours)
ECO	Economic Total US Assistance (Millions of Dollars)
EIN	Installed Capacity (Thousands of Kilowatt Hours or MWh)
EIP	Export - Import Bank Loans (Millions of Dollars)
EMI	Military Total US Assistance (Millions of Dollars)
EPC	Per Capita Total US Assistance (Dollars)
EPD	Production of Electricity (Millions of kilowatt hours or GWh)
ETO	Total US Assistance (ECO + EMI in Millions of Dollars)
FPO	Per Capita Food Production Index
GAG	Agriculture as percent of Gross Domestic Product
GCF	Commerce and Finance as percent of Gross Domestic Product
GCN	Construction as percent of Gross Domestic Product
GIN	Investment as percent of Gross Domestic Product
GMF	Manufacturing as percent of Gross Domestic Product
GMI	Military Expenditures as percent of Gross Domestic Product
GMN	Mining and Quarrying as percent of Gross Domestic Product
GTC	Transport and Communication as percent of Gross Domestic Product
GTO	Total Gross Domestic Product (GDP) at Constant Market prices ($ Millions)
GUT	Utilities as percent of Gross Domestic Product
IMR	Infant Mortality Rate (Deaths per 1000 live births)
POU	Urban Population in standard terms (Percent over 20,000)
POT	Total Population (Millions)
RDK	Length of Roads (Km)
RRK	Total Length of the Railway Network (Km)
HYD	Per Capita Consumption of Hydrocarbons (Kgm of Petroleum Equivalent)

sampling variation of the regression coefficients; thus, reducing the efficiency of the model. Those variables deemed to be most revealing will be chosen for the analysis. For instance, if ECD and EIN have a correlation coefficient higher than .85; then, only ECD will remain in the analysis. This approach will be consistently applied throughout this phase.

4. Finally, FA will be applied to the final set of observations with the goal of reducing the dimensionality of the data even further.

3.4 Trends

The trend of terrorism in Latin America indicates a sudden increase in the late 1970s (see Figure 4.1 in Chapter 4). With this in mind, a research will be performed to investigate if this increase coincided with other significant events in the region or in the world. The investigation will concentrate in those events that may potentially be associated with terrorism and is mostly based on judgement.

3.5 Country Selection

Forecasting models will be developed for:

1. A representative developing nation. Assuming that all the nations under study are developing nations, we take an average of all the socio-economic variables for each year. This data set represents a "Composite Developing Nation" for this research.
2. Two particular groups. During our research in Chapter 2, we noticed that at least two distinct groups could be generated from the countries under study. These groupings are:
   (a) Bolivia, Colombia, and Peru. This group is largely associated with drug trafficking and will be referred to as Drug Country. Other countries such as Ecuador and Panama could

also belong in this group; however, the extent of these countries' dependence on illegal drugs is not as extensive as the initial three.

(b) El Salvador, Guatemala, Honduras and Nicaragua. We will refer to this group as Insurrection Country. Characteristics of these countries are revolution, ties between local terrorist groups, socialist sponsorship, close proximity to each other, etc.

3. Each individual country.

3.6 Country and Terrorism Relationship

First, countries will be characterized based on the level of terrorist activities (TER). This characterization could be by individual countries or groups.

Also, the socio-economic data will be reduced to a smaller set containing a summary of the most revealing variables (see Table 4.5 in Chapter 4). This reduction is largely based on subjective reasoning. The smaller data set will be analyzed for potential factors or trends that match the TER characterizations. In addition, a multivariate technique called Cluster Analysis will be used to investigate potential groupings of the countries based on a reduced socio-economic data.

3.6.1 Cluster Analysis. The purpose of Cluster Analysis is to place objects (countries) into groups or clusters suggested by the data, not defined a priori, such that objects in a cluster are similar in some sense, and objects in different clusters tend to be dissimilar (SAS, 1985:45). The correlation matrix of the reduced socio-economic data set will be used for clustering so that all variables are treated as equally important (SAS, 1985:802).

3.7 Factor Analysis

FA will be performed in an exploratory manner. That is, FA will be applied to each set of independent variables in order to investigate the underlying structure and dimensionality of the data.

Since the variables under consideration have different units and vary widely in variance, the correlation matrix for each data set will provide the basis for FA.

Once the correlation matrix is derived for each data set (see Appendix A), then the method of Squared Multiple Correlation (SMC) is used to estimate the communalities discussed in Chapter 2. The SMC method makes use of the entire correlation matrix by using the square multiple correlations of each variable with the remaining variables as communality estimates. The SMC coefficient provides a measure of shared variance; that is, it represents the variation of a variable that can be accounted for by the other variables. Specifically, the SMC is used for correcting the diagonal elements of the correlation matrix. This correction yields a reduced correlation matrix (Dillon and Goldstein, 1984:72).

At this point, we proceed to extract the factors. Three widely used techniques are Principal Components, Principal Factors and the Maximum Likelihood methods (Bauer, 1992) .Our technique of choice is the Principal Factor Method. This technique extracts the factors of the reduced correlation matrix such that each factor accounts for the maximum possible amount of the variance contained in the set of variables being factored (Dillon and Goldstein, 1984:73).

The extraction of factors from a reduced correlation matrix could be performed by finding the eigenvalues associated with such matrix. If A represents the correlation matrix with elements a, b and d; and I is an identity matrix; then, the process is as follows:

$$A = \begin{bmatrix} a & b \\ b & d \end{bmatrix}$$

Then,

$$determinant(A - \lambda * I) = \begin{bmatrix} a - \lambda & b \\ b & d - \lambda \end{bmatrix} = (a - \lambda) * (d - \lambda) - (c * b) = 0$$

The eigenvalues could be obtained by finding the values of λ that solve the above equation (Bauer, 1992) . Each factor is associated with each eigenvalue. The number of factors retained for investigation depends on the criteria and judgment of the analyst. One rule of thumb is to extract factors until the sum of the eigenvalues is close to the total communality (Dillon and Goldstein, 1984:75).

Next, the factor loadings are obtained by finding the eigenvectors associated with each eigenvalue. These eigenvectors could be found by solving

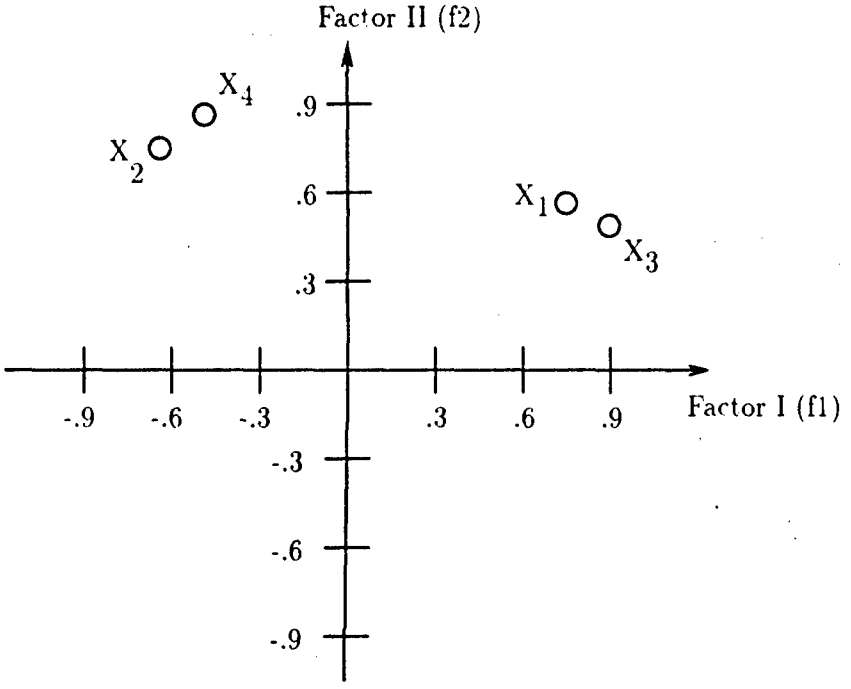
$$(A - \lambda * I) * v = 0$$

The factor loadings, $f1, f2, \ldots, fn$, are the projections of the independent variables X_1,X_2, ..., X_n on Factor I, Factor II, . . ., Factor N, respectively.

A pattern might emerge by examining the factor loadings matrix. The procedure is as follows (Dillon and Goldstein, 1984:69):

1. Identify the highest absolute loading in each row.
2. Assess the significance of each variable and its loading.
3. Identify a label to represent the variables that load on each factor.

Finally, if no patterns are visible at this point we will try the procedure of rotating the factors to clear up the structure. The Orthogonal Rotation method will be used for this purpose. This concept can be best explained by the example shown in Figure 3.1 (Dillon and Goldstein, 1984:88).

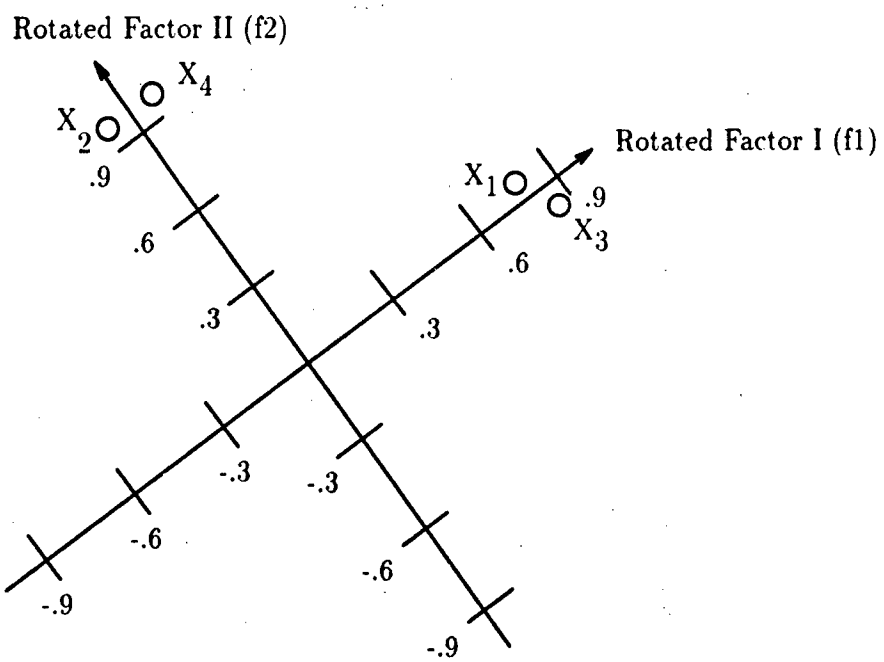


Unrotated Axes

X1 (very high f1, high f2)
X2 (high f1, very high f2)
X3 (very high f1, high f2)
X4 (high f1, very high f2)

Figure 3.1. Factor Loadings

Figure 3.1 shows the unrotated axes for Factors I and II. In this case, it is very difficult to distinguish a structure for the factor loadings. For instance, X_1 and X_3 load very high on f_1 and high on f_2. The same applies to X_2 and X_4 with respect to f_2 and f_1. An interpretation of this pattern is difficult at best. However, if the axes are rotated as shown in Figure 3.2. Then, the structure could be simplified a great deal.



Rotated Axes
X1 (very high f1, low f2)
X2 (low f1, very high f2)
X3 (very high f1, low f2)
X4 (low f1, very high f2)

Figure 3.2. Orthogonal Rotation

Figure 3.2 shows that X_1 and X_3 can be identified with f_1 due to high loadings on Factor I and low loadings on Factor II. Similarly, X_2 and X_4 are identified with f_2. The factor pattern might look like

f1	f2
X1	X2
X3	X4

Sometimes, this simplification in the structure of the data helps the interpretation of the activity a great deal.

There are several procedures to achieve orthogonal rotation. They include the varimax, quartimax and equimax methods. This research will use the varimax method. This method seeks to rotate the factors so that the variation of the squared factor loadings for a given factor is made large (Dillon and Goldstein, 1984:91).

Now, we turn our attention to factor scores. As described in Chapter 2, factor scores represent the projection of each observation on every factor. We will use regression analysis to estimate the factor scores. Regression analysis will be discussed later in the chapter.

3.8 Instability Index

The sponsor assigned three levels of instability to each country from 1960 to 1987. These levels are listed in Table 3.2 and Table 3.3 for the years under investigation. These levels are

1. Pre-Instability (PRE)
2. Instability (INS)
3. Post-Instability (POST)

We will assume that an index could be generated to assess the level of instability. This index could range from 0 to 1. In order to generate this index, we will assume that instability could be represented as a linear function.

Reviewing Table 3.2, it is apparent that information is lacking to generate an index level for each country. However, the table does indicate that Argentina may be a good case study to

Table 3.2. Levels of Instability

Year	Country							
	AR	BO	CH	CO	CR	EC	ES	GU
1970	PRE	PRE	PRE	INS	POST	PRE	PRE	PRE
1971	INS	PRE	PRE	INS	POST	PRE	PRE	INS
1972	INS	PRE	PRE	INS	POST	PRE	INS	INS
1973	INS	PRE	INS	INS	POST	PRE	INS	INS
1974	INS	PRE	INS	INS	POST	PRE	INS	INS
1975	INS	PRE	INS	INS	POST	PRE	INS	INS
1976	INS	PRE	INS	INS	POST	PRE	INS	INS
1977	INS	PRE	INS	INS	POST	PRE	INS	INS
1978	INS	PRE	INS	INS	POST	PRE	INS	INS
1979	POST	PRE	POST	INS	POST	PRE	INS	INS
1980	POST	PRE	POST	INS	POST	PRE	INS	INS
1981	POST	PRE	POST	INS	POST	PRE	INS	INS
1982	POST	PRE	POST	INS	POST	PRE	INS	INS
1983	POST	PRE	POST	POST	POST	PRE	INS	INS
1984	POST	PRE	POST	PRE	POST	PRE	INS	INS
1985	POST	PRE	POST	INS	POST	PRE	INS	INS
1986	POST	PRE	POST	INS	POST	PRE	INS	INS
1987	POST	PRE	POST	INS	POST	PRE	INS	INS

Table 3.3. Levels of Instability

Year	Country						
	HO	NI	PA	PE	PN	UR	VE
1970	PRE	PRE	POST	POST	INS	INS	POST
1971	PRE	INS	POST	POST	INS	INS	POST
1972	PRE	INS	POST	POST	PRE	INS	POST
1973	PRE	INS	POST	POST	POST	INS	POST
1974	PRE	INS	POST	POST	POST	POST	POST
1975	PRE	INS	POST	POST	POST	POST	POST
1976	PRE	INS	POST	POST	POST	POST	POST
1977	PRE	INS	POST	POST	POST	POST	POST
1978	PRE	INS	POST	POST	POST	POST	POST
1979	PRE	POST	POST	POST	POST	POST	PRE
1980	PRE	POST	POST	POST	POST	POST	PRE
1981	PRE	PRE	POST	PRE	POST	POST	INS
1982	PRE	PRE	POST	INS	POST	POST	INS
1983	PRE	PRE	POST	INS	POST	POST	POST
1984	PRE	PRE	POST	INS	POST	POST	POST
1985	PRE	PRE	PRE	INS	POST	PRE	POST
1986	PRE	PRE	PRE	INS	POST	PRE	POST
1987	PRE	PRE	PRE	INS	POST	PRE	POST

generate a instability index. Then, the following methodology will be applied to the data set for Argentina.

First, we assign the values of zero to the first period of pre-instability and to the last period of post-instability. We also assign the value of 1 to all periods of instability. Then, we construct a line between the first period of pre-instability and the first period of instability. Similarly, we construct a line between the last period of instability and last period of post-instability. These lines so generated will serve to obtain values for the instability indexes for the years 1970 through 1987.

Figure 3.3 shows the index derived from the instability assessment for Argentina.

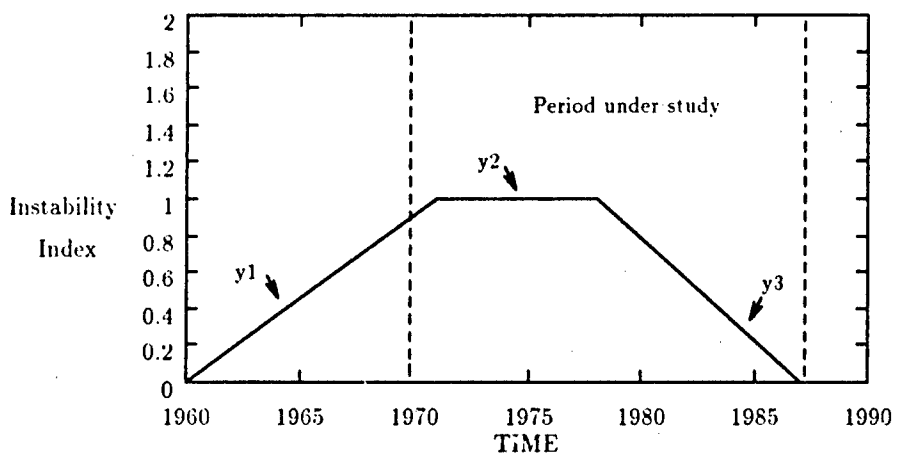


Figure 3.3. Instability Index For Argentina

Following the above methodology, the three lines are given as:

$y_1 = \frac{t-1960}{11}$ from 1960 to 1971 (PRE)

$y_2 = 1$ from 1971 to 1978 (INS)

$y_3 = 1 - \frac{t-1978}{9}$ from 1978 to 1987 (POST)

Substituting t for the appropriate years we obtain the values for the instability index. These values can be used to generate the linear models for monitoring the trends of an instability index. The values are given in Table 3.4.

Table 3.4. Instability Index

Year	AR
1970	0.91
1971	1
1972	1
1973	1
1974	1
1975	1
1976	1
1977	1
1978	1
1979	0.89
1980	0.78
1981	0.67
1982	0.55
1983	0.44
1984	0.33
1985	0.22
1986	0.11
1987	0

3.9 Statistical models

The methodology of linear regression is mainly used to generate the statistical models. Inputs for these models include the socio-economic variables and the factor scores generated by FA.

3.9.1 Multiple Linear Regression. The goal of MLR is to estimate or predict the mean value of a dependent variable Y (response) based on given values of the independent variables $X_1, X_2, \ldots, X_n$ (predictors).

The model is

$$Y = \beta_0 + \beta_1 * X_1 + \ldots + \beta_n * X_n + \epsilon$$

as noted in Chapter 2, the $\beta's$ are unknown regression coefficients and ϵ represents the independent (uncorrelated) random error term with mean zero and constant variance (Neter and others, 1990:229).

A linear regression model could be estimated by finding the expected value of the above model.

$$E(Y) = \hat{y} = \beta_0 + \beta_1 * X_1 + \ldots + \beta_n * X_n$$

This linear regression model may be described pictorially as in Figure 3.4 (Neter and others, 1990:27). It is important to point out that there are several values of Y, lying on its probability distribution, for each value of X. We select the expected value of Y (its mean value), as the most likely response at each X. Then, the regression line is formed by uniting all these expected values of Y.

In matrix form, the model could be expressed as follows,

$$E(Y) = X * \beta$$

where

$$X = \begin{bmatrix} 1 & X_1 & X_2 & \cdots & X_n \\ \vdots & \vdots & \vdots & \ddots & \vdots \end{bmatrix}$$

$$\beta = \begin{bmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_n \end{bmatrix}$$

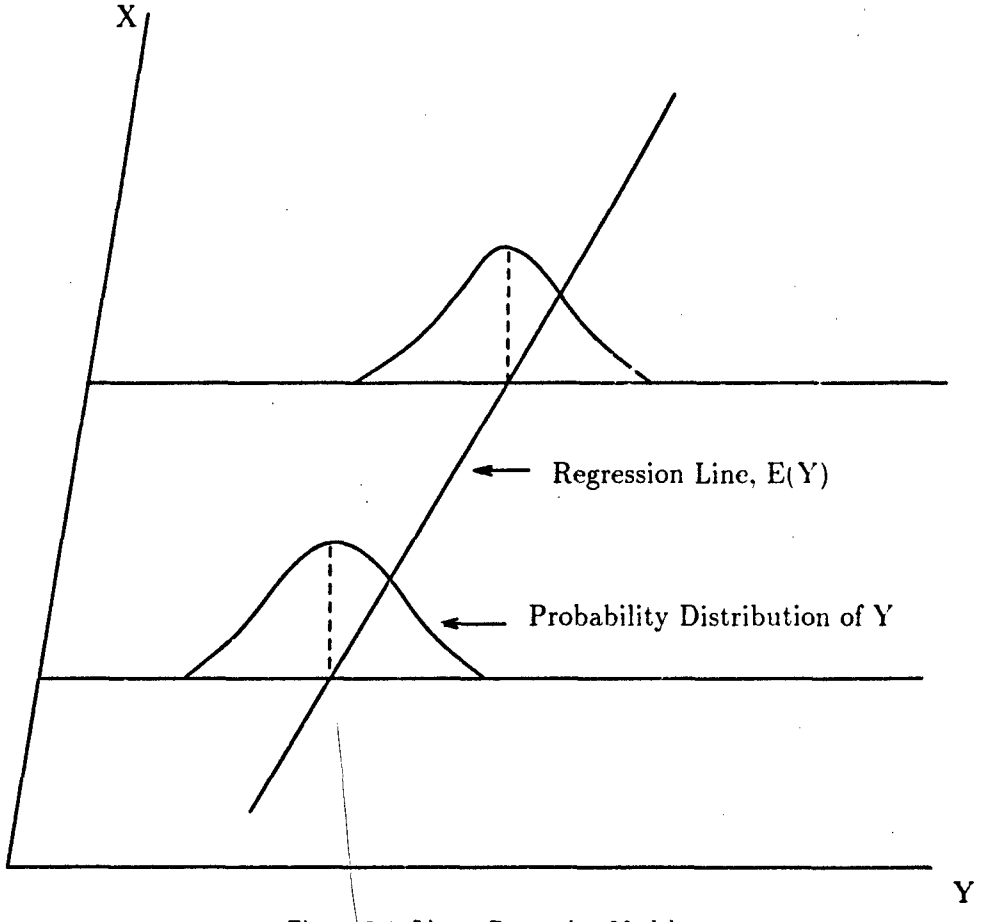


Figure 3.4. Linear Regression Model

Using the method of least squares (Neter and others, 1990:106-107), the regression coefficients are estimated by,

$$\hat{\beta} = (X^T * X)^{-1} * X^T * Y$$

At this point, the model has been developed as X is known and β is estimated by $\hat{\beta}$.

3.9.1.1 Model selection. Significant socio-economic variables will be determined through the stepwise method due to the large number of variables present in each data set. This method determines which socio-economic variables should be included in the regression model. The stepwise procedure is very helpful in exploratory analysis because it can provide insight into the relationships between the independent variables and the response. However, it does not guarantee the best model (SAS, 1985:763-768).

There are several methods of model selection such as forward selection, backward elimination, maximum R^2 improvement, etc. This research will utilize the backward elimination procedure.

Basically, this method was selected because we can start with all the variables present in the model. Then, one variable at a time is deleted based on a pre-determined statistical contribution such as significance level. The significance level (α) must be chosen according to the needs of the analysis. For instance, a small significant level is appropriate when one wants to guard against including any variable that does not contribute to the predictive power of the model. On the other hand, a moderate significant level, between .10 and .25, should be chosen to develop the model that provides the best prediction using the sample estimates. This will prevent the estimation of more parameters than can be reliably estimated with the given sample size.

Since our objective is to generate the best prediction based on the data provided, a moderate significance level of .15 will be utilized for model selection using the backward elimination method.

The stepwise procedure will only apply to models developed based on socio-economic variables. Models developed based on factor scores will use all the factors generated by FA because of their relatively small number per data set.

3.9.2 Checking for Model Adequacy. Several assumptions are necessary to fit regression models to the given data. First, we assume that the errors are uncorrelated random variables with mean zero and constant variance in order to estimate the model parameters. We also assume that the process behaves in a specific linear fashion and proceed to generate the linear models accordingly.

We will check for the validity of the first assumption as we develop our models in the next chapter. The second assumption will be accepted at face value for simplicity and because we lack enough information to validate it. It is important to point out that we will not check for the normality of the errors since such assumption was not required because we are not interested in hypothesis testing in a statistical sense or interval estimation in this research.

There are several ways to check for the adequacy of the model. For instance, the adjusted coefficient of determination R^2 is often used for this purpose. R^2 loosely represents the amount of variability in the data explained or accounted for by the model. One drawback to this approach is that R^2 can always be improved by adding more terms to the model. However, a model with many variables does not necessarily become the best (parsimonious) model possible (Montgomery and others, 1990:31).

Another technique available for model adequacy and the one that we shall use in this research is called residual analysis. This technique consists in evaluating plots of the residuals,

$$e = \text{actual value - predicted value}$$

in time sequence or against the fitted (predicted) values or against the independent variables.

Generally, these plots will look like the four patterns described in Figure 4.5 (Montgomery and others, 1990:33].

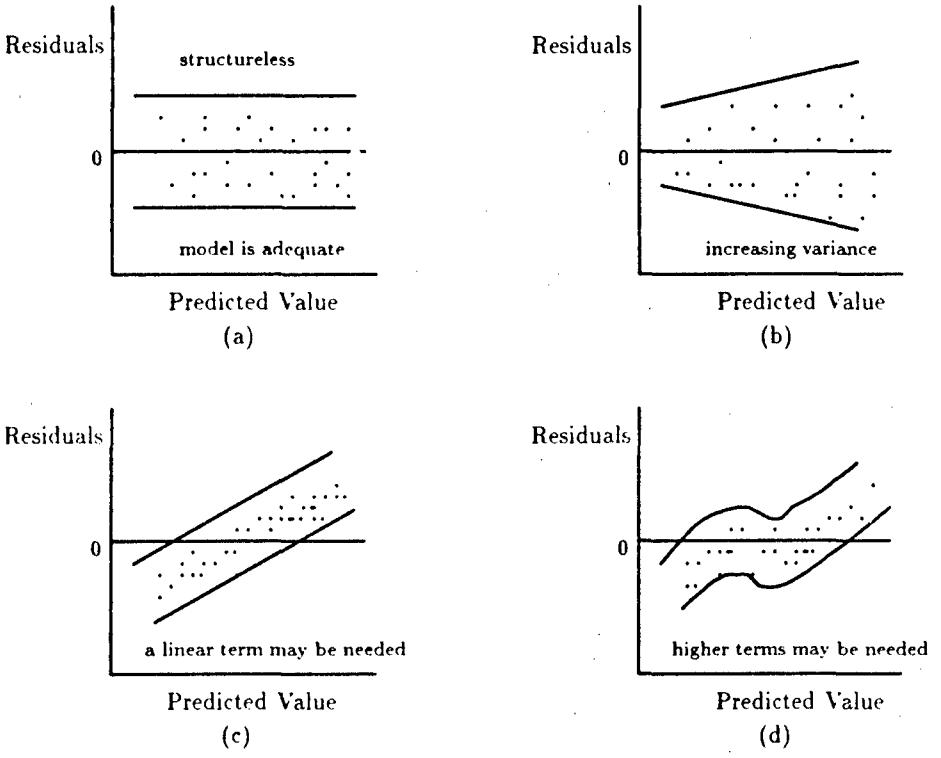


Figure 3.5. Patterns for Residual Plots

As shown in the Figure 4.4, if the regression model is a good fit to the data, then the residuals should be structure-less or show no obvious pattern as in (a). This will indicate the validity of our first assumption.

In addition, we must also be concerned with autocorrelation in the errors due to the fact that the data is provided in time sequence. Autocorrelation is associated with successive observations that are highly dependent (Mykytka, 1992).

Autocorrelation may be assessed by computing the sample autocorrelations of the forecast errors or by computing the Durbin and Watson statistic d. In the first case, the sample autocor-

relations should be close to zero for model adequacy. In the second case, the d statistic should be close to two (SAS, 1985:682). The d statistic is given by

$$d = \frac{\sum_{i=2}^{n}(e_i - e_{i-1})^2}{\sum_{i=1}^{n} e_i^2}$$

Due to the ease of computation, we will use the d statistic to assess autocorrelation. If autocorrelation is present, then other methods (i.e. time series analysis) may yield better results. However, if the model generated shows good results; then, a decision to use the model or not depends on the analyst and the process at hand.

3.10 Summary

The approach and methodology discussed in this chapter provide the basis for our research. A more detailed description of the specific techniques can be found in the referenced material. In addition, part of this research requires some personal judgement. For instance, the grouping of countries for model development, or the ranking of countries for data analysis, or the labeling of the factor patterns, etc. are all based on judgement. Although these decisions do not directly influence the methodology, they do affect the interpretation of the results.

IV. Results and Discussion

4.1 Introduction

Results obtained from the methodologies described previously are presented in this chapter. First, variable selections are summarized. Then, trends for terrorism and potentially related events are discussed Also, an assessment of how terrorism affects the different countries is presented. Next, a discussion of the results for factor analysis and regression analysis is provided.

4.2 Data

The methodology for data reduction was applied to 18 data sets. These sets included the original data provided for each of the 15 countries, and three additional sets generated based on our discussion in the previous chapter. The extra sets provide data for a representative developing country labeled "Composite Country", and two representative groups labeled "Drug Group" and "Insurrection Group". The data for the composite country was generated by condensing the entire data set to a single mean vector. In a similar fashion, Drug Group represents the sample means of Bolivia, Colombia and Peru; and, Insurrection Group represents the sample means of Guatemala, El Salvador, Honduras and Nicaragua.

4.2.1 Variable Selection. Initially, the data was analyzed for completeness. Based on this review, we chose not to include the socio-economic factors EMI, EIP, and GIN. Then, we applied the assumption that correlation coefficients of .85 or higher represented high correlations. Thus, we selected one representative socio-economic factor for each of these cases as described in the previous chapter. These chosen factors and all other remaining factors comprised our final data sets. A summary is provided in Tables 4.1, 4.2 and 4.3. The data sets can be found in Appendices A and B.

Table 4.1. Variable Selection

AVERAGE	GROUP 1	GROUP 2
CAL	CAL	CAL
CBR	CBR	CBR
ETO	EPC	ECD
FPO	ETO	EIN
GCN	FPO	GCF
GMF	GAG	GCN
GMN	GCN	GMF
GUT	GMF	GMN
RRK	GMI	GTC
HYD	GMN	
	GUT	
	RRK	
	HYD	

Table 4.2. Variable Selection

AR	BO	CH	CO	CR	EC	ES	GU	HO	NI	PA
CAL	CAL	CAL	CAL	CAL	CAL	CAL	CAL	CAL	CAL	CAL
CBR	CBR	CBR	CBR	CBR	CBR	CBR	CBR	CBR	CBR	CBR
EAP	ECD	EAP	ETO	ETO	EAP	ECD	ECD	EAP	ECD	EAP
ETO	ETO	ETO	FPO	FPO	ETO	ETO	EPC	FPO	EPD	ETO
FPO	FPO	FPO	GMF	GAG	FPO	FPO	ETO	GAG	ETO	FPO
GAG	GAG	GAG	GMI	GCN	GCF	GAG	FPO	GCF	FPO	GAG
GCF	GMF	GCF	GMN	GMI	GCN	GCN	GAG	GCN	GAG	GCF
GCN	GMI	GCN	GTC	GMN	GMF	GMI	GMF	GMF	GCF	GMI
GMI	GTC	GMN	GUT	GTC	GMI	GMN	GMN	GMN	GCN	GTC
GTC	GUT	GTC	RRK	GUT	GMN	GTC	GTC	GTC	GMF	
GTO		GTO	HYD	RRK	GUT		HYD	HYD	GMN	
HYD		RDK			IMR				GTC	
		RRK			RRK				GUT	
									RDK	
									RRK	

Table 4.3. Variable Selection

PE	PN	UR	VE
CAL	CAL	CAL	CAL
CBR	CBR	EPD	CBR
EAP	EAP	ETO	EAP
ETO	ETO	FPO	ETO
GCN	FPO	GAG	FPO
GMF	GCF	GCN	GAG
GMI	GCN	GMF	GCN
GMN	GMN	GMN	GMI
GTC	HYD	GTC	GTO
GUT		GTO	GUT
RRK		RDK	
HYD			

4.3 Trends

An evaluation of the terrorist activities in Latin America indicated a sudden increase starting approximately in 1978. Figure 4.1 shows the general trend. Specific trends for each country can be constructed from the data in Appendix A and are shown in the plots of the statistical models in Appendix E.

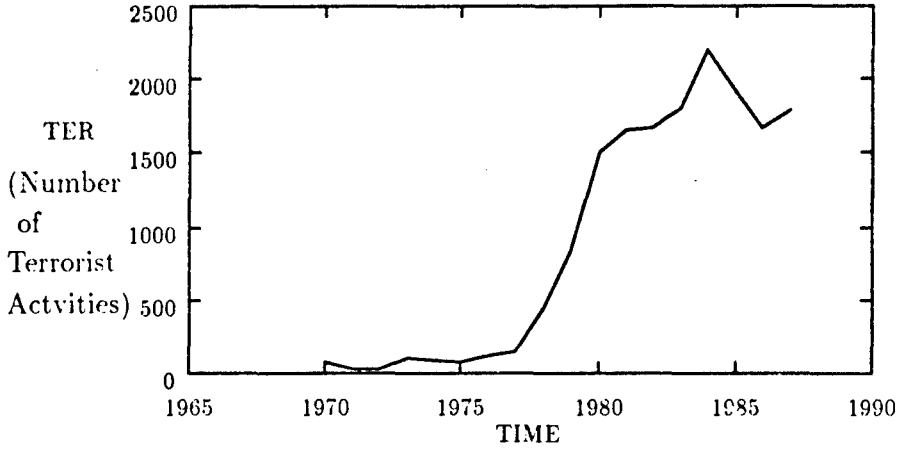


Figure 4.1. Terrorism Trend in Latin America

Figure 4.1 also shows that there was a down trend around 1984. A further breakdown of terrorist activities is depicted in Figure 4.2.

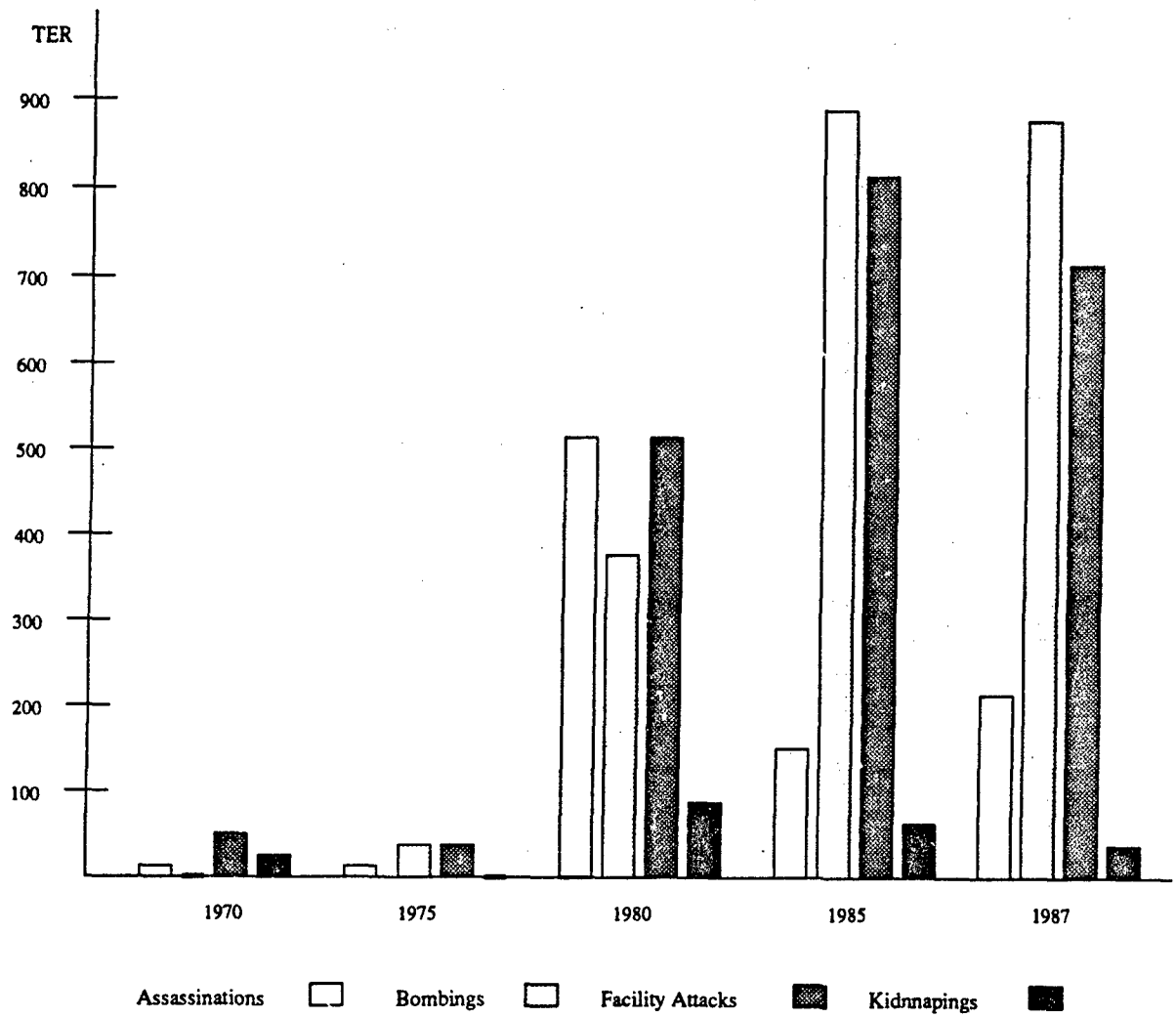


Figure 4.2. Breakdown of Terrorist Activities

Figure 4.2 indicates that bombings and facility attacks systematically increased through 1985. The figure also showed a slight decline in these activities after 1985. This follows the same overall trend of terrorism in Latin America.

Kidnappings appear to have decreased since 1980. This trend is difficult to assess because the number of kidnappings does not directly provide a measure of its success. For instance, one kidnapping of a high executive or politician may yield a larger pay-off or benefit than several kidnappings of less important personnel. On the other hand, assassinations provide a clear indication of increasing violence as they have been on the rise throughout the 18 years of study.

The increasing trend of terrorism during the 1970s was not limited to Latin America. The entire world experienced the increasing wave. Several significant events seem to coincide with such an increase. In particular, we have noticed that the oil crises of the 1970s, the booming cocaine business of the last several years, and the rise to power by the Sandinistas in Nicaragua may have a relation to terrorism in Latin America.

4.3.1 Oil Crises. The oil crises of the 1970s (74 and 79) caused severe turmoil around the world. The impact of these crises was two-fold. On the down side, some countries experienced severe economic and social distress such as massive unemployment, trade slumps, etc. At the opposite end, some traditional poor countries such as Iran, Iraq, Libya, Kuwait, etc. became extremely wealthy. Some of these countries chose to return to strict religious fundamentalism; and in the process a new political era at the international level began.

This era brought several changes, including tremendous political turmoil in the Middle East. Some countries from the region such as Libya became active supporters of all kinds of terrorism. This support was very expensive. Undoubtedly, the new oil wealth enabled some of these countries to sponsor all types of terrorism abroad. Also, the taking of American hostages in Iran in 1979, the numerous hijackings, kidnappings, etc. provide an indication of the mind set of these countries in regards to terrorism.

There are numerous examples of a sudden increase in terrorism that occurred shortly after the first oil crisis in 1974. For instance, terrorist activities were routinely performed by the IRA in Great Britain, the Red Army in Japan, the Baader Meinhoff in Germany, the Red Brigades in Italy, etc. Our own data indicates a rise in terrorist activities in Latin America just three or four years later. A possible explanation for the delay may be that it took sometime for the infrastructure of Latin American terrorism to be developed.

Figure 4.3 shows the trend of the price of oil (Saudi Arabian Light Crude) from 1950 through 1985. Figure 4.4 shows that the trend of oil prices leads the trend in terrorist activities by roughly 3 years.

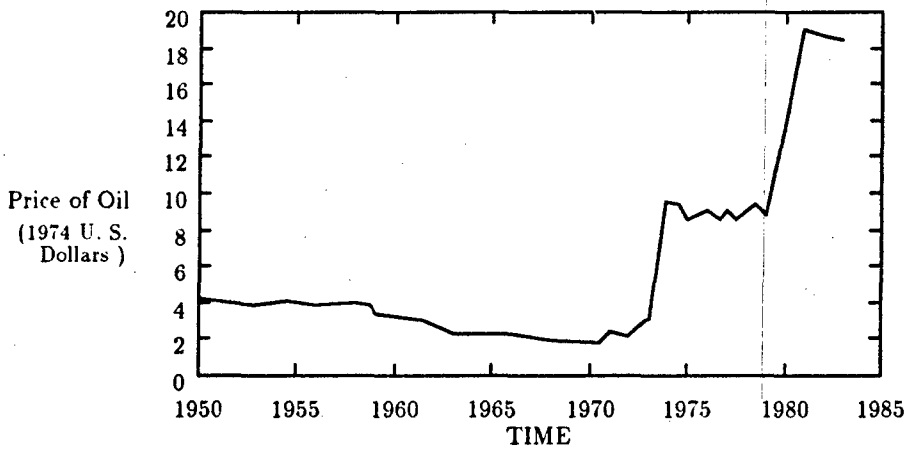


Figure 4.3. Price of Oil (Saudi Arabian Light Crude)

4.3.2 Cocaine Operations. The cocaine business experienced a large boom in the 1970s. For instance, U.S. imports of cocaine increased 5 to 10 fold during 1977 to 1987 while other drugs such as heroin and marijuana remained roughly stable during that time period (Bender and Leone, 1990:183). Also, in approximately 1983 the price of cocaine tumbled creating turmoil as several groups and individuals struggled to gain control (Bender and Leone, 1990:177). These trends follow the general history of terrorism in Latin America.

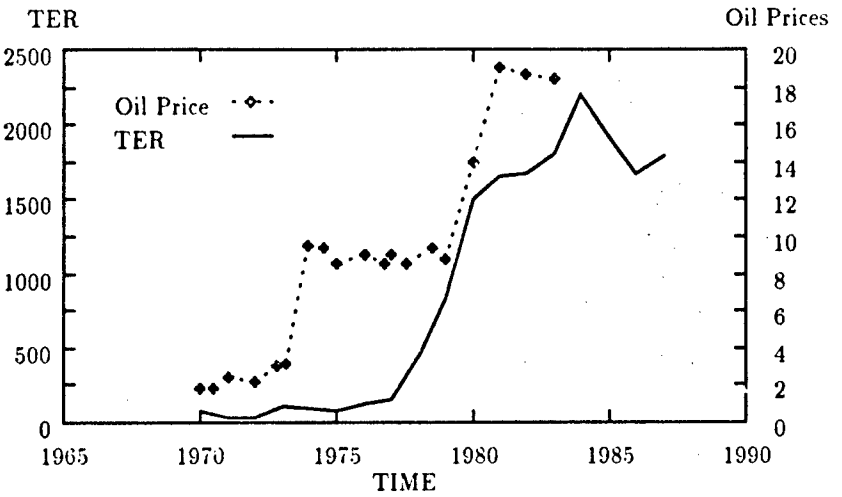


Figure 4.4. Comparison of Oil and TER Trends

Drug cartels in the region, especially in Colombia, have became very powerful. Countries like Peru and Bolivia have become the world's major cultivators of coca leaves used to produce the drug. In fact, it is estimated that over 115,000 hectares in each country are dedicated to growing the crop (Bender and Leone, 1990:168). Other countries such as Ecuador and Panama are also involved in this highly lucrative trade.

This illegal business seems widespread in the region. Therefore, there is ample indication that the drug trade has contributed a great deal to the expansion of terrorism in the region.

4.3.3 The Sandinista Revolution. The success of the Sandinistas in Nicaragua may have provided an inspiration to other terrorist groups in Latin America. In fact, the Sandinistas came to power in 1979, roughly coinciding with the rise of terrorism in Latin America. The Sandinista influence has been evident in countries like El Salvador, Honduras, and Guatemala. As discussed in Chapter II, this influence extends to the direct support of arms, training, resources, etc. Then, it is reasonable to accept that the material, logistic and moral support provided by Nicaragua also had a major impact in the spread of terrorism in the region.

4.4 *Country Selection*

The 15 countries under investigation were selected by the sponsor. These countries represent most of the region of Latin America and provide the basis for this research.

Three additional representative data sets were generated for a composite developing nation, Drug country (Bolivia, Colombia and Peru) and Insurrection country (Guatemala, El Salvador, Honduras and Nicaragua). The basis for such groupings was the pattern observed while researching the literature in Chapter 2.

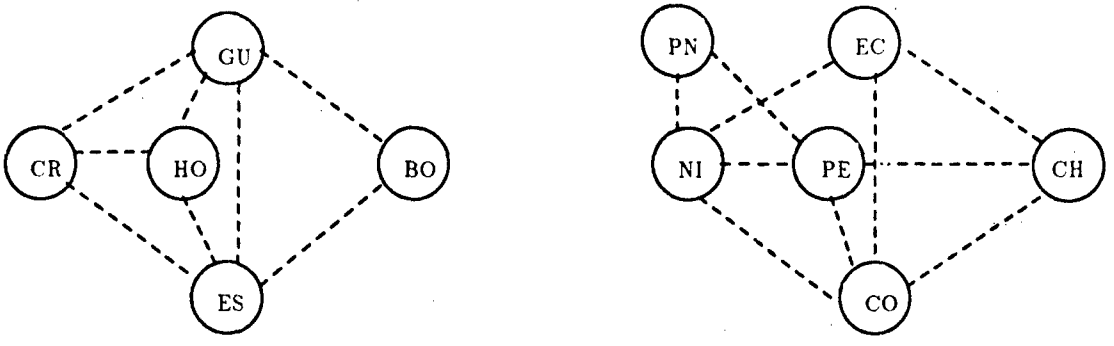
Other possibilities exist. For instance, Figure 4.5 shows the networks obtained if we group based on statistical correlations for the terrorist activities listed in Appendix A. Correlations higher than .6 were assumed to indicate a high correlation among the countries. One network or Group 1 is composed of Bolivia, Costa Rica, El Salvador, Guatemala and Honduras. No obvious link is apparent in this network. However, terrorist groups in El Salvador, Guatemala and Honduras interface with each other a great deal. Another network or Group 2 is composed of Chile, Colombia, Ecuador, Nicaragua, Panama and Peru. One apparent connection in this network is their involvement in drug related activities.

Other groupings may be obtained if we based our rationale on yet other factors such as per capita income, population, type of political regimes (i.e. dictatorships, democracies) etc. Some judgement is needed here and depends on the objective of the analysis.

4.5 *Country and Terrorism Relationship*

It is important to assess where terrorism is more active. If a pattern exists, then a conclusion to its causes may emerge.

Based on total terrorist activities from 1970 through 1987, a ranking such as in Table 4.4 can be generated. This ranking indicates that countries like El Salvador and Peru are worst off or more unstable than countries like Paraguay and Panama. Figure 4.6 shows a comparison among



GROUP 1 GROUP 2

Figure 4.5. Networks - High TER Correlations

the different countries based on the data in Table 4.4. Basically, we can conclude that there are three possible classifications. These are:

1. Group A: El Salvador, Peru and Colombia are the three leading countries in TER.
2. Group B: Chile, Guatemala, Nicaragua and to a lesser degree Argentina have mid-level TER activities.
3. Group C: Countries with low TER are Bolivia, Costa Rica, Ecuador, Honduras, Panama, Paraguay, Uruguay and Venezuela.

A characterization or ranking of the countries in some other fashion may indicate a relation with the results in Table 4.4. Our data in socio-economic factors provides one way to characterize these countries.

A review of these factors indicate that CAL, ECD, EPC, GTO, IMR, and HYD may be the most revealing variables. For instance these factors could provide a measure of:

- CAL - how well fed the population is

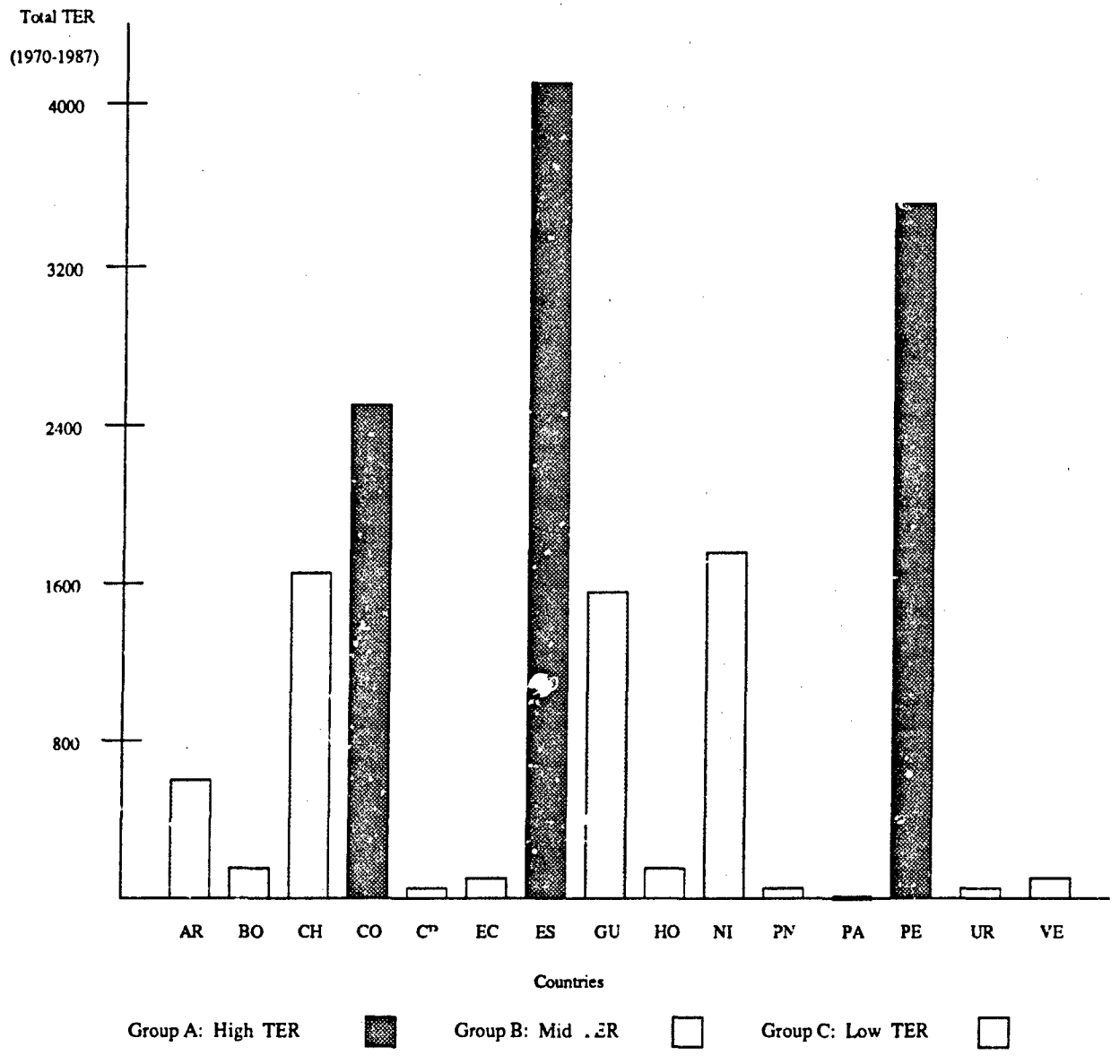


Figure 4.6. Terrorism by Countries

Table 4.4. Country Ranking - TER

Country	TER	Ranking
ES	4117	1
PE	3345	2
CO	2558	3
NI	1764	4
CH	1625	5
GU	1593	6
AR	596	7
BO	162	8
HO	157	9
VE	91	10
EC	85	11
UR	77	12
CR	42	13
PN	35	14
PA	9	15

- ECD - access to modern commodities
- EPC - level of U.S. intervention
- HYD - access to luxury items (i.e. automobiles)
- IMR - access to health care
- GTO - wealth of each country

Table 4.5 provides an average of each factor for the 18 years under study for each country.

The evaluation of the data in Table 4.5 consisted in ranking by:

- individual factor (CAL, FPC, GTO, etc.)
- certain groups (CAL, IMR; ECD, HYD)
- the aggregate

This data analysis indicated that countries with a high level of terrorism have a lower per capita consumption of electricity, higher infant mortality rate and lower per capita consumption of hydrocarbons.

Table 4.5. Variables - Data Average

Country	CAL	ECD	EPC	GTO	IMR	HYD
AR	3291.6	1293.9	2.4	76279.3	41.1	1059.2
BO	2052.9	237.5	8.8	3904.9	134.9	189.7
CH	2646.2	1003.3	3.7	22879.2	44.2	492.3
CO	2414.3	739.3	3.8	29780.8	57.4	344.3
CR	2569.3	888.6	27.5	3118.9	31.1	268.8
EC	2049.9	348.6	3.5	9914.6	75.1	349.3
ES	2122.9	289.1	33.1	3230.2	52.3	123.0
GU	2135.8	206.8	5.9	6663.0	70.9	139.4
HO	2119.9	219.7	20.7	2177.7	89.3	132.2
NI	2376.7	398.8	7.3	2258.3	87.4	220.1
PA	2813.9	238.7	3.3	3372.2	49.8	103.8
PN	2363.1	968.1	17.4	3138.6	32.8	503.7
PE	2203.8	538.0	5.4	18869.0	101.9	374.0
UR	2837.2	1085.6	2.7	6005.6	39.4	490.5
VE	2551.7	2017.1	2.3	48055.3	39.9	1732.9

A Cluster Analysis of Table 4.5 reveals the following clusters:

- Cluster 1: AR, CH, CO, EC, GU, PE, VE
- Cluster 2: HO, NI, PA
- Cluster 3: BO, CR, ES, PN, UR

These results indicate some consistency with the groupings based on TER. For instance, AR, CH, and GU are grouped together in Cluster 1 and Group B, and, BO, CR, PN, and UR are grouped together in Cluster 2 and Group C.

Also, an analysis of the literacy rate and per capita annual income (see statistics for each country in Chapter 2) indicates that:

- Group A has an average literacy rate of 79% and a per capita annual income of $946.
- Group B has an average literacy rate of 82% and a per capita annual income of $1,400.
- Group C has an average literacy rate of 82% and a per capita annual income of $1,576.

This indicates that countries with high terrorism has lower literacy rate and per capita annual income.

Also, Figure 4.7 indicates that GTO and GMI generally follow the historical trend of terrorism for Latin America. This indicates that U.S. assistance and military expenditures have some connection with terrorist activities. However, there is not enough information to conclude whether there is cause and effect relationship among these factors.

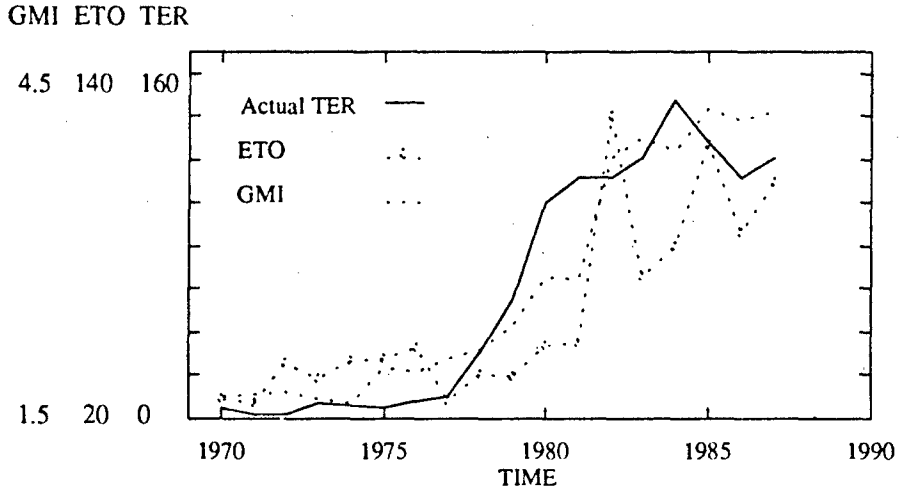


Figure 4.7. Trends of TER, GTO, and GMI

In conclusion, the analysis showed that several socio-economic (ECD, IMR, HYD, GMI, GTO, literacy rate, and per capita income) may be good indicators to analyze terrorism trends in Latin America.

4.6 Factor Analysis

The results obtained for composite nation, Drug Group and Insurrection Group are described in the next tables (see Table 3.1 in page 3-3 for the description of the socio-economic variables). Appendix C lists the results for the factor patterns after rotation for each country. Run 1 will

represent FA performed only on the socio-economic variables. Run 2 will show the results when TER is combined with the socio-economic variables.

Table 4.6. FA for Composite Country - Run 1

Unrotated FA	
f1	f2
- CAL	FPO
CBR	GCN
- ETO	HYD
GMF	
GMN	
- GUT	
RRK	

Rotated FA	
f1	f2
- CAL	FPO
CBR	GCN
- ETO	HYD
GMF	
GMN	
- GUT	
RRK	

Table 4.7. FA for Composite Country - Run 2

Unrotated FA	
f1	f2
- TER	FPO
- CAL	GCN
CBR	- GMN
- ETO	HYD
GMF	
- GUT	
RRK	

Rotated FA	
f1	f2
TER	FPO
CAL	GCN
- CBR	- GMN
ETO	HYD
- GMF	
GUT	
- RRK	

Reviewing Table 4.6 and Table 4.7, it is apparent that the structure was not simplified by the orthogonal rotation. Also, it is very difficult to identify any pattern or underlying structure in the data. For instance, under f_1 the factors CAL and CBR may indicate a certain dimension, i.e. subsistence. The factors GMF, GUT, and RRK may indicate another category, i.e. industrial index. The other factors do not appear to contribute to the previous labels. Therefore, no consistent labeling could be assigned to the dimension f_1. The same applies to f_2.

For the Drug Country, the rotation of axes offers a slight improvement for assessment as shown in Tables 4.8 and 4.9. For instance, f_1 may represent an index related to survival or subsistence given by CAL, CBR, FPO, GAG and even TER. It is not clear the contribution of GCN and GMI in this factor. No obvious category is present in f_2. In Run 2, f_3 may be labeled as outside intervention, i.e. U.S., given by ETO, EPC and RRK (the U.S. does provide technical

Table 4.8. FA for Drug Group - Run 1

Unrotated FA			
f1	f2	f3	f4
- CAL	EPC	- GMF	
CBR	ETO	- RRK	
FPO	- GMN	HYD	
GAG	GUT		
GCN			
- GMI			

Rotated FA			
f1	f2	f3	f4
- CAL	EPC	ETO	GMF
CBR	- GMN	- RRK	- GUT
FPO	HYD		
GAG			
GCN			
-GMI			

Table 4.9. FA for Drug Country - Run 2

Unrotated FA			
f1	f2	f3	f4
- TER	EPC	- GMF	
- CAL	ETO	- RRK	
CBR	- GMN		
FPO	GUT		
GAG	HYD		
GCN			
- GMI			

Rotated FA			
f1	f2	f3	f4
TER	- GMN	EPC	GMF
CAL	HYD	ETO	- GUT
- CBR		- RRK	
- FPO			
- GAG			
- GCN			
GMI			

and economical help to some countries for infrastructure development such as RRK). Also, f_4 may be labeled an industrial index given by GMF and GUT.

Table 4.10. FA for Insurrection Country - Run 1

Unrotated FA		
f1	f2	f3
CAL	ECD	
- CBR	GTC	
ECO		
EIN		
GCF		
- GCN		
- GMF		
GMN		

Rotated FA		
f1	f2	f3
- CAL	ECO	ECD
CBR	GCF	EIN
GCN	- GTC	
GMF		
- GMN		

Tables 4.10 and 4.11 provide no insight into the underlying structure of the data for the Insurrection Country.

Basically, the same observations listed above apply to the rotated factor patterns for each individual country in Appendix C.

Table 4.11. FA for Insurrection Group - Run 2

Unrotated FA		
f1	f2	f3
TER	GTC	ECD
CAL		
- CBR		
ECO		
EIN		
GCF		
- GCN		
- GMF		
GMN		

Rotated FA		
f1	f2	f3
- TER	CAL	ECD
CBR	ECO	EIN
- GCN	GCF	GTC
- GMF		
GMN		

Generally, it was hoped that enough consistency was present in these patterns to develop reasonable dimensions. For instance, subsistence could be given by CAL, CBR, FPO and IMR; U.S. intervention could be given by ECO, EMI, EPC, and ETO; industrialization or growth may be represented by EAP, ECD, EIN, EPD, GMF, GTC, GTO; infrastructure may be represented by GCN, GTC, GUT, RDK, RRK, etc. Other labels and groupings may be generated and depends on the knowledge and experience of the analyst.

4.7 Linear Models

In this section the causal models generated by each method are presented for the composite country, drug country, insurrection country and Argentina. Regression by Least Squares based on the actual variables will be denoted as LS Regression. Regression based on the factor scores will be referred as FA Regression. Also, the sample size for every case is 18 (the number of years for the period under study).

Composite Country

LS Regression Model: $TER = 883.79 + 0.39 * CAL - 42.01 * CBR - 0.36 * ETO - 40.45 * GMN$

$$-85.75 * GUT$$

FA Regression Model: $TER = 60.26 - 52.14 * f1 - 15.94 * f2$

$d(LS) = 2.48$ $\qquad$ $d(FA) = 1.33$

Since d is not close enough to 2, we conclude that autocorrelation is present in both models. At this point, other techniques may be used for model generation. However, Figure 4.8 shows that the LS model and FA model track the trend of historical values of TER reasonably well. These plots indicate that the LS model is more accurate than the FA model.

Also, the regression coefficients for the LS model indicate that terrorism would be reduced significantly by an increase in crude birth rate, mining and quarrying, and utility services. Intuitively, it appears reasonable to accept such results. For instance, an increase in birth rates and utility services may indicate thriving and prosperity. Also, mining and quarrying operations represent a traditional industry in Latin America. An increase in such operations may be an indicator of jobs and local control of revenues.

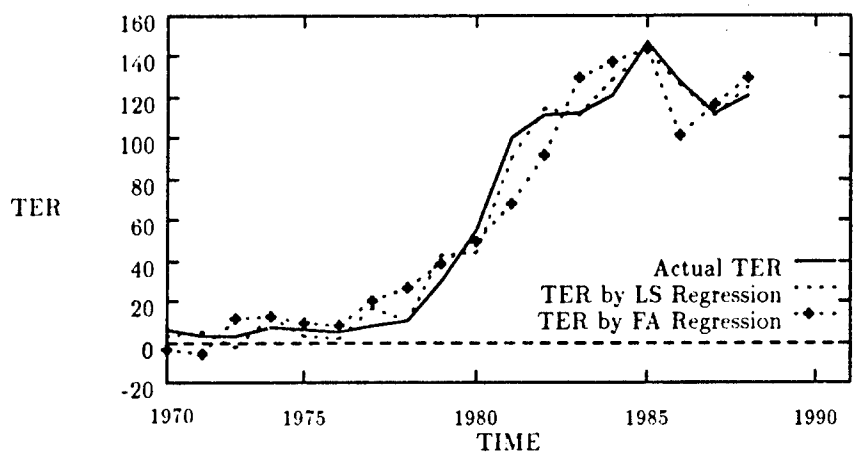


Figure 4.8. Composite Country - TER Models

The adequacy of the model can be assessed by analyzing the residuals in Figure 4.9. There is no visible pattern present in these residual plots.

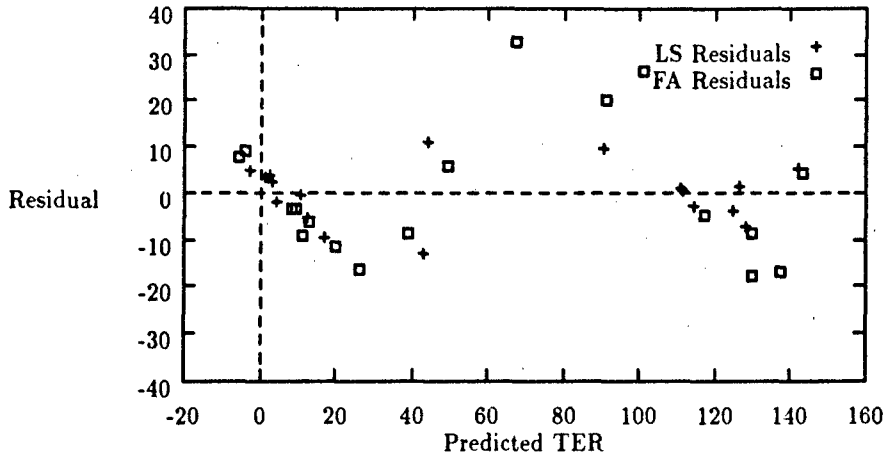


Figure 4.9. Composite Country - Residual Plot

Drug Group

LS Regression Model: $TER = -360.81 + 0.88 * CAL - 29.19 * CBR - 0.26 * ETO - 20.07 * GCN$

$$-33.51 * GMF + 23.96 * GMI + 16.03 * GMN + 0.51 * HYD$$

FA Regression Model: $TER = 112.54 - 120.75 * f1 - 19.92 * f2 + 3.92 * f3 - 19.49 * f4$

$d(LS) = 3.46$ $\qquad$ $d(FA) = 1.81$

Since d for the LS model is much above 2, we conclude that autocorrelation is present. This is not the case for the FA model. Figure 4.10 indicates that the general trend of TER is fairly well represented by both models. Also, the LS model appears more accurate. In addition, the regression coefficients of the LS model indicate that terrorism would be reduced by an increase in CBR, GCN and GMF. On the other hand, terrorism would increase significantly by an increase in military expenditures.

An analysis of Figure 4.11 indicates there is no pattern present for either model.

Insurrection Group

LS Regression Model: $TER = 5624.24 - 30.59 * CBR - 208.32 * GCF + 251.77 * GCN$

$$-60.03 * GMF + 468.59 * GMN - 216.23 * GTC$$

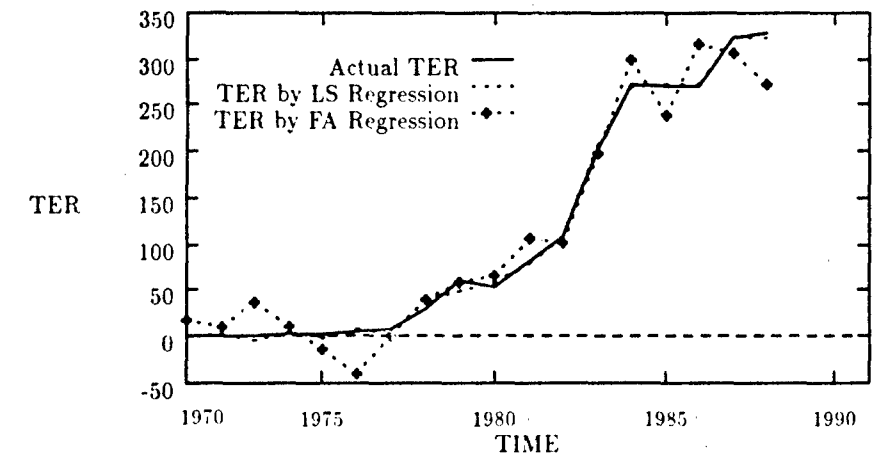


Figure 4.10. Drug Country - TER Models

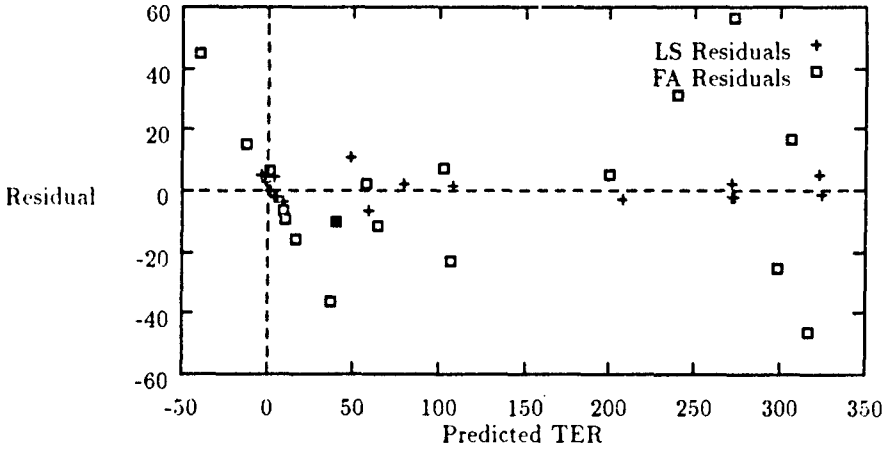


Figure 4.11. Drug Country - Residual Plot

FA Regression Model: $TER = 106.04 - 79.45 * f1 - 22.99 * f2 + 57.98 * f3$

$d(LS) = 2.04$ $\quad$ $d(FA) = 2.24$

Since d for both models are close to 2, then we conclude that no autocorrelation is present. Figure 4.12 shows that both models fit the data well around 1980 but leads the process by about two years approximately in 1984. The LS model indicates that terrorism would decrease by an increase in CBR, GCF, GMF and GTC. On the other hand, terrorism would rise significantly by an increase in GMN. This is not surprising since the mining and quarrying industry may provide the raw material for terrorist activities in this type of group, i.e. bombings in Peru.

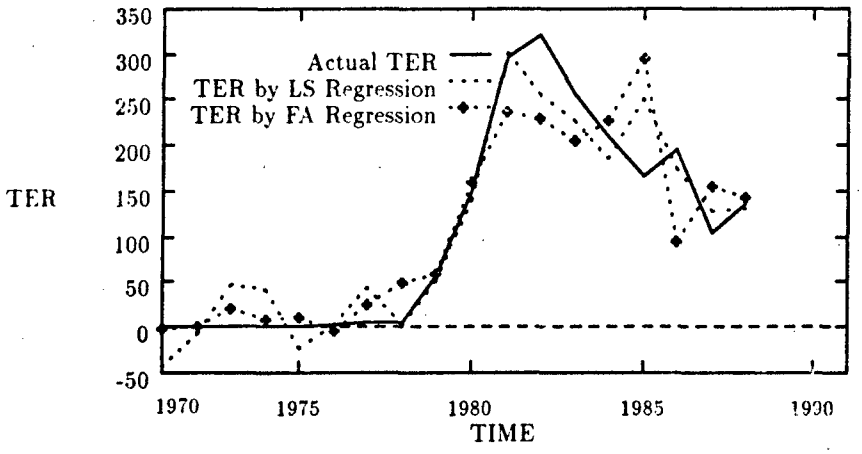


Figure 4.12. Insurrection Country - TER Models

Figure 4.13 indicates that the models are adequate.

Appendix D, Appendix E and Appendix F list the models and additional statistics, plots of the models, and residual plots, respectively, for each country. A summary indicates that autocorrelation is present to some degree in almost every case except in the LS models for Argentina, Colombia, Panama, Uruguay and Venezuela; and in the FA models for Costa Rica, and Venezuela. Also, all the LS and FA models follow the general TER trend for each country except Paraguay and Venezuela. The residual plots indicate no visible pattern except for Argentina and Ecuador where

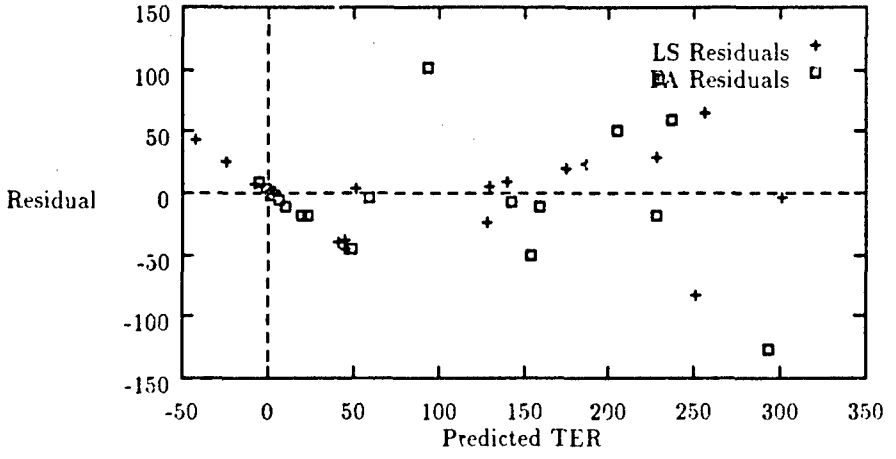


Figure 4.13. Insurrection Country - Residual Plot

variance may be increasing; and Chile, Guatemala, Paraguay, Peru, and Uruguay where there is an indication that some linear term may be missing from the models.

Instability Index for Argentina

The results for the instability index, INS, for Argentina are:

LS Regression Model: $INS = -6.09 + 0.002 * TER + 0.003 * CAL + 0.0001 * ETO$

$+0.007 * GAG + 0.037 * GCN - 0.039 * GMI + 0.047 * GTC - 0.00001 * GTO - 0.003 * HYD$

FA Regression model: $INS = 0.72 + 0.3 * f1 - 0.15 * f2 + 0.05 * f3 - 0.03 * f4$

$d(LS) = 2.25$ $\quad$ $d(FA) = 1.1$

It appears that autocorrelation is present, especially in the FA model. Figure 4.14 shows that both models track the trend reasonably well. The LS regression coefficients indicate that instability would increase significantly by an increase in GTC. A possible explanation may be that reporting about unstable events may actually contribute to the spread of instability in other regions. Also, the model indicates that instability would decrease by an increase in GMI.

A review of the residual plots for each model in Figure 4.15 indicates that no visible pattern is present.

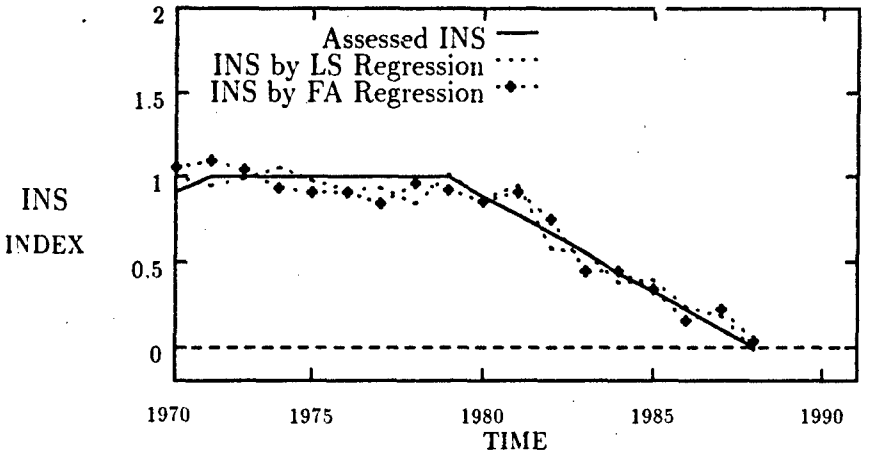


Figure 4.14. INS Index Models for Argentina

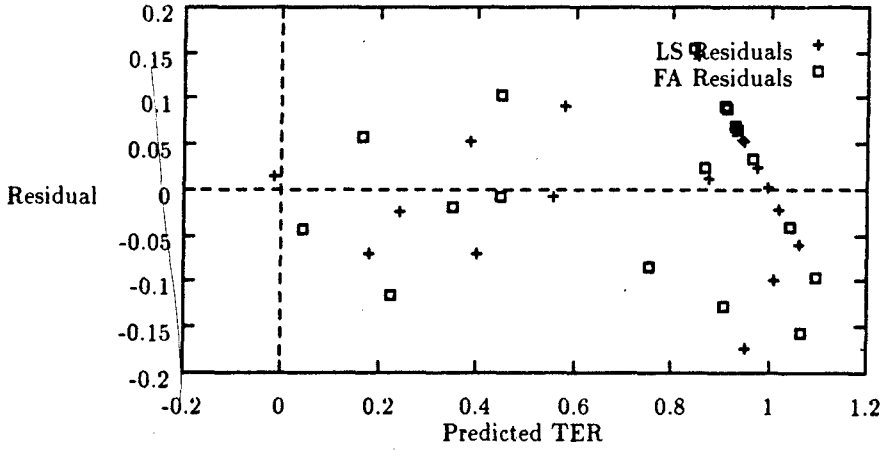


Figure 4.15. INS Index for AR - Residual Plot

V. Conclusions and Recommendations

5.1 Introduction

This chapter is devoted to identifing the problem areas that affected this research, summarizing the findings, discussing conclusions and providing recommendations. First, several factors that limited this study are discussed. Next, we briefly summarize the important results described in Chapter IV. Then, conclusions based on the analyses are presented. Finally, recommendations for working analysts and future research efforts are provided.

5.2 Limiting Factors

This research was [illegible] study directed at predicting the trend [illegible] factors internal and external, that affect the events. Due [illegible] problem and lack of data, a broad and comprehensive evaluation was not possible.

Another problem was the limited literature available (or our inability to identify it) in this specific area. Although, there are a myriad of reports, books and articles about terrorism and instability, the most common approaches are based on sociology and economics. In fact, factors called economic indicators (leading, lagging, or coincidental) are extensively used. However, economic indicators are time series that offer cyclic variations ranging from recessions to recoveries. Some of these indicators have already been proven reliable in predicting certain economic trends. This is not the case for our socio-economic factors. As a consequence, there was a lot of subjectivity or art in dealing with our predictors rather than relying in proven scientific guidelines.

Also, the lack of established guidelines to characterize instability presented a problem. First, a qualitative assessment was provided by the sponsor on instability levels (PRE, INS, POST). Next, we assumed that a linear function was appropriate to describe the actual process. Then, we

performed the statistical analysis. Thus, we had to base the analysis on a sequence of assumptions rather than on a proven or well known measure or function of the instability process.

5.3 Summary of Results

The significant results include:

1. The general trend of terrorism from 1970 to 1987 was reasonably well modeled.
2. The specific trends of terrorism for each country was fairly well modeled for all countries except for Paraguay and Venezuela.
3. The trend of instability based on the instability index was well modeled.
4. The Least Squares methodology offers a better fit than a regression model based on factor scores as expected.
5. No overall underlying structure of the data was uncovered.
6. Data analysis showed that countries with a higher relative standard of living (i.e. high per capita consumption of electricity, low infant mortality rate, high per capita consumption of hydrocarbons, high literacy rate and high per capita annual income) generally experienced a lower number of terrorism. Other important variables were military expenditures as per cent of the gross domestic product, and the level of U.S. intervention.
7. Certain world events seem to have contributed to the expansion of terrorism in Latin America.

5.4 Conclusions

The basic conclusion is that the trend of terrorism may be forecasted with certain degree of confidence. Such confidence level varies depending upon the trend of the historical data. Also, the trend of a linear stability index could be represented fairly well. Least Squares or Factor Analysis regression models provide a reasonable approximation for both terrorism and stability index trends.

The commonly held belief that terrorism and instability are caused by repressive conditions (i.e. low standard of living) seemed valid based on the limited data analysis performed.

5.5 Recommendations

Several recommendations emerge from this research. These recommendations are derived from the actual analysis and from the insight gained as a result of spending the last six months studying the subject.

Also, these recommendations can be divided into two categories: those applicable to personnel involved in the field and to those that will embark in future related research.

5.5.1 Working Analyst. Specific recommendations for personnel in the field are:

1. The models provided should be used cautiously. They should be used in conjunction with other indicators.
2. Since these models require predictions of the socio-economic indicators or factor scores (inputs) in order to predict terrorism or stability (responses), care must be exercised in predicting the inputs as the ultimately desired responses are highly dependent on such predictions.
3. The models should be used for trend prediction and not for specific yearly values.
4. The models could be improved if additional inputs are considered. The importance of these inputs depends on the role they play in the status of a nation or region.

5.5.2 Future Research. Specific recommendations for personnel endeavoring in associated research are:

1. Efforts must be taken to define instability as analytically as possible.
2. Time Series Analysis may provide more adequate and accurate models.

3. Predictors considered should be chosen so that the process is properly represented. This includes the evaluation of economic indicators as well as additional socio-economic factors such as literacy rate and per capita income.

4. Analytical methods such as discrimination analysis should be investigated to group the countries or predictors reliably and in a way that makes sense.

Appendix A. Data Summary

Table A.1. Argentina

YR	TER	CAL	CBR	EAP	ETO	FPO	GAG	GCN	GMI	GTC	GTO	HYD
1970	23	3318	22.9	9318	33.9	88	13.1	5.8	1.9	10.1	66022.1	1071
1971	12	3318	23.4	9373	55.7	82	12.1	5.3	1.6	10.1	68080.5	1069
1972	26	3340	22.9	9428	65.0	78	10.9	5.4	1.6	9.9	70139.0	1067
1973	73	3340	22.7	9483	42.2	82	11.7	5.0	1.3	10.2	72197.4	1065
1974	78	3340	22.4	9538	64.2	86	11.7	5.2	1.6	9.9	76654.0	1063
1975	42	3362	25.0	9593	94.9	86	11.4	4.9	2.8	9.6	76016.8	1061
1976	57	3362	25.5	9718	39.6	100	12.3	4.2	2.5	9.6	75662.6	1062
1977	18	3362	25.4	9843	16.3	98	12.7	6.1	2.5	9.5	80537.1	1063
1978	25	3386	25.2	9968	27.4	101	13.3	6.4	2.2	9.5	77760.1	1063
1979	16	3386	23.3	10093	32.8	104	13.9	6.1	2.6	9.6	83290.7	1064
1980	8	3386	24.7	10218	79.2	96	12.9	7.6	2.6	10.9	84988.5	1065
1981	2	3195	23.7	10351	82.6	101	13.7	7.8	2.8	11.1	79022.5	1023
1982	9	3195	22.8	10484	551.1	104	15.2	6.1	5.9	11.4	74448.8	1030
1983	18	3195	23.9	10618	0.0	100	15.2	4.7	3.9	11.3	76385.1	1063
1984	46	3191	23.0	10751	0.1	101	15.4	3.6	3.3	11.6	78127.4	1059
1985	44	3191	21.4	10884	0.0	97	10.9	4.1	3.9	3.4	74519.4	987
1986	14	3191	21.4	11017	0.0	99	10.3	3.9	3.7	8.4	78875.1	1044
1987	86	3191	21.4	11150	2.4	96	10.2	4.1	3.7	8.4	80300.2	1147

Table A.2. Bolivia

YR	TER	CAL	CBR	ECD	ETO	FPO	GAG	GMF	GMI	GTC	GUT
1970	1	1948	45.4	160	6.4	97	16.8	12.9	1.6	8.9	2.0
1971	3	1948	45.4	164	13.3	96	17.0	12.7	1.4	8.7	2.0
1972	0	1995	45.4	193	64.8	101	16.8	12.8	1.8	8.9	1.9
1973	0	1995	45.4	198	31.4	105	16.0	12.5	1.9	8.8	1.9
1974	1	1995	45.4	208	54.4	104	15.7	12.9	2.1	9.2	1.9
1975	0	2041	46.6	216	33.2	111	15.7	13.5	2.4	9.2	1.9
1976	2	2041	43.5	225	52.1	110	18.4	14.8	2.3	10.1	1.5
1977	1	2041	44.8	244	73.4	101	17.0	15.4	2.1	11.0	1.6
1978	4	2086	44.8	256	71.5	99	16.9	15.7	2.0	11.4	1.6
1979	14	2086	44.8	264	57.9	97	16.3	15.8	2.2	11.5	1.6
1980	35	2086	44.8	281	30.4	100	17.1	15.4	1.9	11.6	1.6
1981	5	2061	44.0	294	12.8	104	18.4	15.4	2.3	12.8	1.8
1982	26	2061	44.0	286	19.7	106	21.7	14.0	4.8	12.5	2.1
1983	28	2061	44.0	277	63.0	77	17.4	14.2	4.4	12.8	2.3
1984	15	2127	44.0	264	78.1	96	19.0	12.6	4.0	12.2	2.4
1985	12	2127	42.9	253	54.0	101	19.6	9.8	4.0	7.4	0.9
1986	2	2127	42.9	249	79.0	96	19.8	10.0	4.0	7.7	0.9
1987	13	2127	42.9	243	79.2	93	23.2	10.6	4.0	7.3	0.9

Table A.3. Chile

YR	TER	CAL	CBR	EAP	ETO	FPO	GAG	GCF	GCN	GMN	GTC	GTO	RDK	RRK
1970	0	2675	26.9	2888	42	107	7.9	17.2	4.2	11.7	5.7	20263	64450	6475
1971	0	2675	27.6	2972	14	106	7.7	17.1	4.3	11.1	5.6	20374	72241	6432
1972	0	2646	27.5	3057	20	98	7.5	16.5	3.9	10.8	5.5	20485	72245	6396
1973	11	2646	26.8	3141	22	87	6.8	16.7	3.6	11.5	5.6	20596	72637	6393
1974	0	2646	25.4	3226	124	101	7.5	16.4	4.1	12.8	5.5	20797	78147	6361
1975	0	2616	25.0	3310	129	101	8.9	16.3	3.5	14.0	5.5	18112	79912	6606
1976	2	2616	21.9	3395	95	93	8.5	17.1	2.5	14.8	5.5	18749	77552	6378
1977	5	2616	21.6	3480	33	100	8.9	18.1	2.4	13.9	5.5	20597	75192	6372
1978	8	2738	21.4	3564	53	92	8.3	18.1	2.2	12.8	5.4	22290	75420	6366
1979	50	2738	21.5	3649	14	98	8.5	18.1	2.7	12.5	5.5	24136	76288	6365
1980	45	2738	22.2	3734	10	97	7.7	18.1	3.3	12.2	6.3	25792	77157	6302
1981	35	2662	23.4	3835	12	105	6.9	20.9	4.5	10.7	7.5	27128	78025	6300
1982	25	2662	23.8	3937	7	101	8.3	17.1	3.9	13.9	7.6	23578	78425	6236
1983	105	2662	22.2	4038	3	95	8.2	17.1	3.9	13.6	7.4	23452	78824	6236
1984	6[illegible]	2574	22.2	4140	2	98	7.4	17.7	3.9	13.4	7.4	24871	79224	6858
1985	[illegible]60	2574	21.6	4241	3	99	8.3	17.1	5.6	10.3	4.9	25477	79224	6740
1986	254	2574	23.8	4342	2	106	7.7	17.1	5.3	9.9	5.0	26838	79223	6551
1987	176	2574	23.8	4444	1	106	8.4	17.1	5.6	9.4	5.3	28292	79223	7998

Table A.4. Colombia

YR	TER	CAL	CBR	ETO	FPO	GMF	GMI	GMN	GTC	GUT	RRK	HYD
1970	1	2158	32.1	131.1	93	17.5	1.4	2.1	7.4	1.5	3431	290
1971	0	2158	31.4	110.1	91	18.1	2.5	2.0	7.5	1.5	3431	299
1972	3	2203	30.4	143.3	88	18.4	1.2	1.7	7.6	1.6	3431	307
1973	6	2248	31.6	107.5	91	18.9	1.0	1.8	7.7	1.7	3431	316
1974	2	2293	32.3	73.1	92	18.9	0.9	1.5	8.3	1.7	3431	324
1975	12	2338	34.1	32.7	92	18.7	1.0	1.4	8.6	1.7	3431	333
1976	23	2383	33.8	68.9	97	18.8	0.9	1.2	8.9	1.8	3403	337
1977	84	2428	32.1	9.8	95	18.7	0.8	1.2	9.1	1.7	3403	340
1978	175	2473	32.1	89.5	98	18.7	0.7	0.5	9.3	1.8	2884	344
1979	144	2473	32.0	64.5	101	18.8	0.8	1.0	9.4	1.8	3403	347
1980	148	2473	31.0	47.1	99	18.3	0.9	1.1	9.7	1.8	3403	351
1981	172	2543	31.0	51.1	100	17.6	0.8	1.2	9.5	1.9	3403	424
1982	229	2543	31.0	553.8	96	16.9	1.8	1.0	12.0	1.6	2710	406
1983	243	2543	31.0	8.4	93	15.8	2.3	1.1	11.9	1.8	3400	379
1984	233	2550	31.0	37.5	95	16.7	2.0	1.3	12.1	1.7	3255	356
1985	394	2550	27.4	142.1	94	22.5	2.3	4.1	9.0	1.5	3255	350
1986	357	2550	27.4	15.8	99	22.3	2.3	4.6	9.1	1.4	3257	344
1987	343	2550	27.4	17.1	100	22.0	2.3	6.2	8.5	1.4	3239	350

Table A.5. Costa Rica

YR	TER	CAL	CBR	ETO	FPO	GAG	GCN	GMI	GMN	GTC	CUT	RRK
1970	0	2404	33.4	18.6	96	25.0	4.7	0.5	0.3	4.8	2.0	574
1971	1	2404	31.3	8.5	102	24.9	4.8	0.6	0.3	4.8	2.1	590
1972	0	2442	31.2	3.9	108	24.5	4.8	0.5	0.3	4.9	2.3	605
1973	0	2442	29.5	3.5	103	24.6	4.8	0.5	0.3	4.7	2.3	621
1974	0	2442	29.6	14.1	96	22.4	4.8	0.5	0.3	4.8	2.3	636
1975	0	2480	29.5	9.0	113	23.5	5.0	0.6	0.3	5.5	2.1	652
1976	0	2480	29.6	12.2	108	21.0	6.8	0.7	0.3	6.2	2.2	667
1977	5	2480	31.1	16.8	107	19.7	6.5	0.6	0.4	6.4	2.2	683
1978	2	2635	29.9	13.2	105	19.3	6.5	0.6	0.4	6.8	2.3	698
1979	1	2635	30.2	22.7	105	18.5	6.7	0.7	0.4	7.2	2.3	714
1980	3	2635	29.4	22.4	99	18.3	6.9	0.6	0.4	7.5	2.4	729
1981	10	2548	29.8	20.4	96	19.8	5.4	0.6	0.4	8.0	2.7	745
1982	6	2548	30.7	56.8	89	21.5	4.2	0.7	0.4	8.4	3.0	760
1983	4	2548	30.0	218.7	89	21.5	4.0	0.7	0.3	8.2	3.6	760
1984	2	2781	32.7	181.1	96	21.2	4.7	0.7	0.4	7.6	3.4	760
1985	4	2781	33.9	232.1	92	19.8	4.2	0.7	0.4	4.3	2.8	700
1986	1	2781	28.3	167.0	92	19.0	4.2	0.7	0.4	4.5	2.8	700
1987	3	2781	28.3	187.1	87	17.8	4.4	0.7	0.4	4.5	2.8	696

Table A.6. Ecuador

YR	TER	CAL	CBR	EAP	ETO	FPO	GCF	GCN	GMF	GMI	GMN	GUT	IMR	RRK
1970	0	1955	37.8	1876	30.7	96	13.8	4.6	17.5	2.3	1.0	1.3	76.6	550
1971	0	1955	38.7	1928	25.1	93	14.1	6.5	17.9	1.8	1.1	1.3	95.0	552
1972	0	2021	37.3	1979	12.5	88	14.1	4.8	18.3	2.0	3.2	1.3	81.9	552
1973	0	2021	42.2	2031	17.8	89	13.6	5.1	17.9	2.0	6.8	1.4	75.8	552
1974	3	2021	42.2	2082	10.9	94	13.0	5.7	17.7	2.0	6.7	1.5	70.2	552
1975	0	2087	42.2	2134	14.4	90	12.8	6.1	18.7	2.3	5.8	1.5	65.8	771
1976	2	2087	41.6	2194	18.1	105	9.6	6.6	18.6	2.0	7.2	1.6	72.1	990
1977	8	2087	41.6	2254	20.3	104	10.1	6.5	20.0	3.1	6.3	1.8	86.0	990
1978	10	2092	41.6	2314	19.9	98	10.2	6.5	21.2	2.2	6.6	1.9	86.0	965
1979	1	2092	41.6	2374	33.1	98	10.1	6.2	21.7	2.0	6.5	2.0	86.0	965
1980	2	2092	41.6	2434	16.4	101	13.8	5.7	20.1	1.9	4.7	1.8	82.5	965
1981	2	2052	36.8	2515	25.5	101	13.8	3.4	23.0	1.9	5.0	1.2	69.5	965
1982	3	2052	36.8	2596	27.9	102	13.8	3.3	22.5	1.7	5.2	1.2	69.5	966
1983	11	2052	36.8	2676	31.2	84	14.5	2.8	23.9	1.7	6.2	1.3	69.5	966
1984	18	2058	36.8	2757	37.1	91	12.9	2.9	25.3	1.8	7.3	1.3	69.5	966
1985	13	2058	36.8	2838	58.6	104	12.7	6.2	26.7	1.8	8.3	1.3	69.5	966
1986	8	2058	32.9	2919	64.9	101	12.6	5.8	8.1	1.8	26.9	1.3	63.4	966
1987	6	2058	32.9	3000	52.0	97	13.1	6.5	8.5	1.8	16.9	1.7	63.4	966

Table A.7. El Salvador

YR	TER	CAL	CBR	ECD	ETO	FPO	GAG	GCN	GMI	GMN	GTC
1970	0	1852	40.0	190	12.9	95	30.6	3.0	1.0	0.2	5.3
1971	0	1852	42.3	209	6.1	97	30.3	3.2	1.1	0.2	5.1
1972	2	1914	40.8	228	18.4	90	29.1	4.0	1.1	0.2	5.1
1973	1	1914	40.3	242	4.9	102	28.5	3.3	1.1	0.2	5.0
1974	1	1914	39.7	254	11.7	97	29.6	3.6	1.7	0.2	4.9
1975	10	2076	39.9	264	10.0	103	29.6	4.1	1.6	0.2	4.9
1976	13	2076	40.2	291	15.0	102	25.6	4.7	1.7	0.2	6.2
1977	6	2145	41.7	318	6.2	100	25.5	5.2	1.8	0.1	6.1
1978	91	2145	39 7	342	10.9	110	26.2	5.3	1.9	0.1	6.0
1979	307	2155	39.3	358	11 5	109	27.5	4.9	2.0	0.1	6.1
1980	816	2155	24.7	325	64.3	100	28.0	4.6	2.1	0.1	5.9
1981	777	2155	21.8	299	146.5	90	29.9	3.3	3.3	0.1	5.4
1982	559	2310	22.1	293	264.2	81	27.5	3.3	4.4	0.2	5.7
1983	380	2310	22.9	306	326.9	83	29.5	3.8	4.4	0.2	5.7
1984	277	2310	20.8	313	412.5	92	29.5	3.5	0.5	0.2	6.0
1985	435	2310	36.3	322	570.2	85	26.6	3.4	6.4	0.1	3.7
1986	208	2310	36.3	313	444.4	87	26.4	3.2	5.5	0.1	3.6
1987	237	2310	36.3	336	574.4	82	26.2	3.5	5.5	0.2	3.6

Table A.8. Guatemala

YR	TER	CAL	CBR	ECD	EPC	ETO	FPO	GAG	GMF	GMN	GTC	HYD
1970	4	2098	41.6	150	6.43	33.9	92	30.1	14.6	0.1	3.5	133
1971	1	2098	43.8	158	4.83	26.2	93	30.5	14.8	0.1	3.5	135
1972	0	2067	44.2	169	3.30	18.4	96	31.1	14.5	0.1	3.7	138
1973	2	2067	42.4	178	5.14	29.5	94	30.7	14.7	0.1	3.8	140
1974	1	2067	42.8	187	1.26	7.6	91	30.7	14.5	0.1	4.1	143
1975	5	2035	40.9	187	2.85	17.8	97	30.4	14.0	0.1	4.1	145
1976	12	2035	42.6	198	7.98	51.3	104	30.1	14.4	0.1	4.2	150
1977	10	2035	42.9	236	4.15	27.5	103	29.0	14.8	0.1	4.2	155
1978	19	2064	41.5	252	1.55	10.6	102	28.5	15.0	0.2	4.2	161
1979	62	2064	42.0	272	3.50	24.7	99	28.4	15.1	0.2	4.3	166
1980	321	2064	43.9	223	1.90	13.8	100	28.0	15.6	0.4	4.4	171
1981	438	2189	43.4	213	2.54	19.0	102	27.7	15.3	0.4	4.5	150
1982	362	2189	42.7	222	2.01	15.5	106	28.0	14.6	0.4	4.4	139
1983	124	2189	40.8	215	3.98	29.7	103	27.8	14.5	0.3	4.3	116
1984	76	2296	40.3	218	2.67	20.3	100	27.6	14.7	0.4	4.4	127
1985	64	2296	41.0	220	15.24	107.6	96	25.1	16.7	0.3	4.4	123
1986	34	2296	40.8	215	14.91	122.1	97	27.9	16.9	0.4	4.5	115
1987	58	2296	40.8	210	22.93	193.5	88	27.7	16.7	0.4	4.5	103

Table A.9. Honduras

YR	TER	CAL	CBR	EAP	FPO	GAG	GCF	GCN	GMF	GMN	GTC	HYD
1970	0	2151	42.7	769	97	34.5	16.1	5.0	14.0	2.2	6.7	148
1971	0	2151	45.2	794	103	35.4	15.8	4.5	14.2	2.2	6.7	145
1972	0	2116	46.1	819	109	35.1	15.5	3.9	14.7	2.2	6.8	142
1973	1	2116	43.6	843	100	34.6	15.3	4.2	15.2	2.8	6.9	139
1974	0	2116	48.6	868	94	31.9	15.8	4.9	15.6	3.2	7.0	136
1975	0	2081	48.6	893	96	29.6	16.1	5.2	16.6	3.9	6.9	133
1976	0	2081	47.0	930	93	30.0	16.4	5.9	14.6	2.0	7.0	133
1977	0	2081	47.1	968	98	28.8	16.8	6.0	15.5	1.9	7.7	133
1978	13	2175	47.1	1005	103	28.0	17.4	6.1	15.9	1.8	7.9	134
1979	6	2175	47.1	1043	94	28.3	17.2	6.1	15.8	1.8	7.8	134
1980	17	2175	47.1	1080	101	27.0	15.1	4.9	16.4	1.8	9.6	134
1981	18	2143	43.9	1120	105	27.5	15.6	4.6	16.4	1.8	9.6	142
1982	33	2143	43.9	1160	95	28.1	15.7	4.9	14.4	2.1	7.5	126
1983	27	2143	43.9	1199	86	28.6	16.2	4.8	15.5	2.1	7.1	128
1984	11	2078	43.9	1239	83	29.0	16.2	5.6	13.9	2.2	7.8	127
1985	5	2078	43.9	1279	80	27.5	16.7	5.4	15.3	2.2	7.1	124
1986	8	2078	39.8	1319	78	25.9	16.4	4.6	14.3	2.7	8.0	115
1987	18	2078	39.8	1359	76	26.0	16.7	4.4	15.7	2.2	8.1	107

Table A.10. Nicaragua

YR	TER	CAL	CBR	ECD	EPD	ETO	FPO	GAG	GCF	GCN	GMF	GMN
1970	2	2536	45.9	310	627	4.2	121	27.0	20.5	3.5	19.2	0.7
1971	0	2536	41.5	348	657	16.2	122	28.3	20.6	3.4	19.2	0.6
1972	0	2409	44.3	386	754	5.6	115	27.6	20.2	3.6	19.5	0.5
1973	0	2409	39.4	354	714	28.8	111	28.0	21.4	4.0	19.4	0.5
1974	1	2409	43.1	419	874	21.9	107	27.9	21.3	5.0	19.2	0.6
1975	1	2445	48.3	432	932	46.8	116	28.3	20.9	4.6	19.3	0.4
1976	0	2445	41.2	476	1057	9.8	116	26.9	20.7	5.3	19.2	0.3
1977	4	2368	46.6	516	1188	36.4	116	25.7	21.0	5.1	19.6	0.2
1978	97	2368	46.6	489	1180	14.6	123	29.5	19.6	3.2	21.1	0.2
1979	221	2188	46.6	373	985	18.5	128	33.5	15.6	1.0	20.0	0.3
1980	35	2188	46.6	380	1099	38.7	86	26.8	18.1	2.1	20.6	0.2
1981	48	2188	44.2	388	1110	59.9	86	28.0	18.5	2.6	19.3	0.2
1982	68	2382	44.2	391	1054	6.3	88	28.0	17.5	2.5	18.5	0.1
1983	308	2382	44.2	416	941	0.0	85	28.2	16.3	1.8	21.2	0.2
1984	308	2382	44.2	392	973	0.1	79	26.4	16.5	2.0	21.7	0.1
1985	276	2382	44.2	381	1059	0.0	78	24.6	16.8	3.2	25.4	0.4
1986	168	2382	41.8	370	1063	0.0	75	22.9	17.0	3.3	26.4	0.5
1987	228	2382	41.8	358	1063	0.0	67	22.7	17.5	3.7	26.3	0.5

Table A.11. Nicaragua -Cont

YR	GTC	GUT	RDK	RRK
1970	5.8	1.7	12978	318
1971	5.8	1.6	13325	318
1972	5.9	2.4	12902	319
1973	6.1	1.7	13670	319
1974	5.9	1.6	14437	320
1975	5.7	1.9	17526	320
1976	5.7	2.2	17832	320
1977	5.8	2.4	18138	345
1978	5.0	2.4	18197	345
1979	5.1	3.0	17311	345
1980	5.7	3.1	16424	345
1981	5.4	3.0	15538	345
1982	5.7	3.1	14651	331
1983	6.0	2.0	14651	331
1984	6.0	1.4	14651	331
1985	5.0	1.9	14651	331
1986	4.9	2.1	14997	331
1987	4.9	2.3	14997	331

Table A.12. Panama

YR	TER	CAL	CBR	EAP	ETO	FPO	GCF	GCN	GMN	HYD
1970	0	2344	37.1	509	11.9	99	14.0	6.3	0.3	459
1971	0	2344	37.2	520	15.4	105	13.9	6.9	0.3	500
1972	0	2371	36.0	530	64.4	101	13.7	7.3	0.3	541
1973	0	2371	33.2	541	61.7	99	14.2	7.3	0.3	581
1974	0	2371	31.2	551	31.3	99	14.7	5.3	0.3	622
1975	0	2398	32.3	562	51.9	103	14.5	6.3	0.3	663
1976	2	2398	38.8	576	43.1	95	14.5	5.4	0.3	647
1977	1	2398	30.9	591	19.4	100	13.5	5.2	0.3	632
1978	0	2290	30.3	605	23.6	101	13.4	4.9	0.2	616
1979	3	2290	28.6	620	26.3	100	14.0	4.9	0.2	601
1980	4	2290	26.9	634	2.3	98	12.3	6.1	0.3	585
1981	3	2305	26.9	659	11.0	102	12.7	5.5	0.3	445
1982	0	2305	26.7	685	18.4	98	12.5	9.3	0.2	417
1983	9	2305	26.4	710	12.9	100	13.0	6.6	0.3	368
1984	2	2439	26.5	736	25.7	98	13.5	5.4	0.2	381
1985	1	2439	26.6	761	85.1	99	13.4	4.9	0.1	360
1986	5	2439	26.7	786	41.9	100	13.8	4.6	0.1	339
1987	5	2439	26.7	812	15.6	92	13.9	4.3	0.1	309

Table A.13. Paraguay

YR	TER	CAL	CBR	EAP	ETO	FPO	GAG	GCF	GMI	GTC
1970	1	2754	36.6	749	9.0	99	34.3	19.5	2.0	4.2
1971	0	2754	36.6	773	13.7	97	33.4	19.8	1.3	4.2
1972	0	2764	36.6	798	5.7	94	33.2	19.5	2.2	4.3
1973	1	2764	36.6	822	8.1	90	33.7	19.6	1.7	4.4
1974	0	2764	36.6	847	7.4	92	34.2	19.7	1.5	4.7
1975	0	2774	35.4	871	9.6	90	33.8	19.7	1.7	4.7
1976	1	2774	35.4	904	10.1	92	32.3	20.0	1.4	5.0
1977	0	2774	36.7	937	3.9	96	31.6	20.0	1.5	4.9
1978	0	2902	36.7	969	4.1	94	30.4	20.5	1.5	4.8
1979	0	2902	36.7	1002	10.3	99	29.3	20.4	1.3	4.9
1980	2	2902	36.7	1035	3.7	98	30.0	20.0	1.4	4.7
1981	0	2817	36.0	1076	6.2	103	29.5	20.0	1.5	4.6
1982	0	2817	36.0	1117	67.7	101	29.2	20.0	1.6	4.6
1983	0	2817	36.0	1157	4.4	103	28.7	20.0	1.8	4.6
1984	2	2843	36.0	1198	2.8	107	29.5	18.5	0.9	4.5
1985	1	2843	36.0	1239	3.6	111	31.4	19.2	1.1	4.3
1986	0	2843	34.9	1280	3.4	100	29.5	19.9	1.1	4.5
1987	1	2843	34.9	1321	3.2	109	30.2	19.9	1.1	4.5

Table A.14. Peru

YR	TER	CAL	CBR	EAP	ETO	GCN	GMF	GMI	GMN	GTC	GUT	RRK	HYD
1970	0	2289	40.5	3808	16.0	4.5	20.6	3.7	8.6	5.8	1.2	2242	369
1971	0	2289	40.5	3946	20.1	4.7	21.3	3.7	7.8	5.9	1.2	2282	380
1972	0	2249	40.5	4084	76.3	5.0	21.6	3.3	7.9	6.2	1.2	2087	391
1973	3	2249	40.5	4223	79.8	5.0	21.8	3.6	7.4	6.4	1.2	1892	402
1974	3	2249	40.5	4361	94.4	5.7	22.0	3.5	7.2	6.6	1.2	1892	413
1975	3	2209	38.0	4492	68.8	6.4	22.3	4.7	6.2	6.9	1.2	1875	424
1976	0	2209	39.7	4657	137.5	5.9	22.5	5.7	6.6	7.1	1.2	1875	414
1977	4	2209	39.7	4814	110.1	5.6	21.3	4.7	8.5	7.2	1.3	1875	405
1978	1	2166	39.7	4972	138.5	4.8	21.2	5.5	9.8	7.3	1.4	1875	395
1979	1	2166	38.0	5129	139.0	4.9	21.5	3.9	10.6	7.5	1.2	1882	386
1980	66	2166	40.0	5287	96.7	3.7	21.2	5.7	8.1	7.9	1.5	2099	376
1981	153	2150	41.5	5470	100.5	3.8	20.2	5.1	7.3	7.6	1.5	2159	374
1982	357	2150	35.7	5653	59.6	4.0	19.6	7.1	8.0	7.9	1.6	2159	390
1983	549	2150	36.8	5836	124.4	3.5	18.2	8.6	8.4	7.8	1.7	2159	374
1984	562	2192	36.4	6019	175.6	3.3	17.8	8.0	8.2	7.6	1.8	2159	319
1985	404	2192	35.5	6202	89.1	2.4	26.1	7.7	11.9	5.9	-0.8	2159	294
1986	610	2192	34.3	6385	59.0	5.4	20.2	6.2	13.2	6.6	0.9	2159	306
1987	630	2192	34.3	6568	65.6	5.8	20.9	6.2	11.9	6.8	1.0	2157	320

Table A.15. Uruguay

YR	TER	CAL	EPD	ETO	FPO	GAG	GCN	GMF	GMN	GTC	GTO	RDK
1970	49	3003	2200	21.2	114	12.6	3.8	23.0	1.2	3.6	5188.6	41745
1971	15	3003	2360	11.5	94	12.6	4.1	22.8	1.3	8.9	5165.7	45689
1972	1	2961	2405	14.3	91	11.7	4.3	23.1	1.6	8.8	5142.9	49634
1973	0	2961	2546	10.6	94	12.1	3.4	22.8	1.7	9.0	5120.0	49634
1974	0	2961	2453	5.6	102	11.8	3.6	23.2	1.8	9.2	5294.0	49714
1975	0	2918	2444	22.1	104	11.5	4.2	24.1	1.6	9.0	5545.6	49794
1976	0	2918	2637	4.4	112	11.8	4.2	23.9	1.3	9.3	5778.8	49874
1977	0	2918	2834	0.6	93	11.7	4.9	25.6	1.4	9.8	5884.2	49954
1978	0	2868	3046	0.2	91	10.4	5.0	25.3	1.0	9.4	6302.9	49954
1979	0	2868	2724	0.2	90	9.9	5.5	25.5	1.1	9.3	6907.9	49794
1980	0	2868	3355	0.0	96	9.8	7.0	22.5	1.5	8.7	7027.7	50024
1981	0	2706	3603	15.0	114	10.1	6.5	22.1	1.4	9.1	7128.2	49813
1982	0	2706	6156	0.8	111	10.7	5.8	20.5	1.1	8.8	6411.7	50360
1983	0	2706	7343	1.1	113	11.1	4.8	17.9	0.9	8.5	6028.2	50907
1984	2	2676	3801	0.7	102	12.1	3.3	20.0	0.8	6.7	5951.3	51453
1985	2	2676	3836	0.1	102	12.3	2.9	25.5	0.9	5.7	5960.5	52000
1986	2	2676	4185	14.5	101	11.8	2.3	25.6	1.0	5.9	6426.2	52000
1987	0	2676	4526	12.9	102	11.6	2.3	26.7	1.3	5.9	6836.6	52000

Table A.16. Venezuela

YR	TER	CAL	CBR	EAP	ETO	FPO	GAG	GCN	GMI	GTO	GUT
1970	3	2412	36.1	3055	21.4	98	7.5	3.8	1.7	49783.0	1.7
1971	4	2412	36.1	3220	29.6	96	7.6	4.4	1.9	46701.7	1.8
1972	2	2475	36.1	3386	53.5	94	7.1	5.4	2.0	43620.5	1.9
1973	4	2475	36.1	3551	27.4	96	7.0	5.7	1.7	40539.2	1.9
1974	2	2475	36.1	3717	35.5	99	7.0	5.3	1.5	43013.2	2.1
1975	5	2538	34.4	3882	16.4	104	7.2	6.1	2.0	45567.1	2.3
1976	4	2538	34.4	4075	63.3	100	6.4	6.7	1.4	49387.6	2.3
1977	4	2538	36.9	4268	0.2	99	6.4	7.8	1.7	52760.0	2.2
1978	10	2649	36.9	4462	22.4	103	6.5	8.2	1.7	50905.3	2.3
1979	0	2649	36.9	4655	18.5	104	6.5	7.9	1.4	51363.0	2.6
1980	7	2649	32.8	4848	159.4	100	7.0	6.8	1.5	50738.7	2.8
1981	7	2664	32.1	5052	59.7	97	7.0	6.1	1.6	50210.8	3.1
1982	2	2664	32.0	5256	26.2	94	6.8	5.8	3.4	49608.2	3.3
1983	6	2664	31.4	5460	12.2	99	6.6	4.8	2.9	46901.0	3.5
1984	6	2532	29.9	5664	0.4	93	7.7	4.1	2.8	46204.6	3.9
1985	2	2532	29.0	5868	0.9	89	6.9	2.7	3.0	47004.9	1.6
1986	9	2532	30.7	6072	0.2	98	7.0	3.3	3.0	49805.1	1.6
1987	14	2532	30.7	6276	0.2	90	7.0	3.3	3.0	50880.7	1.5

Appendix B. Averaged Data

Table B.1. Country - Composite

YR	TER	CAL	CBR	ETO	FPO	GCN	GMF	GMN	GUT	RRK	HYD
1970	5.6	2393.1	36	26.8	100.9	4.3	18.5	4.4	1.6	4137.5	394.9
1971	2.4	2393.1	36.1	24.9	99.7	4.5	18.9	4.2	1.6	4134.4	404.3
1972	2.3	2398.2	36.0	38.3	97.8	4.5	19.2	4.1	1.7	4119.3	413.5
1973	6.8	2401.2	35.4	32.7	97.3	4.5	19.2	4.4	1.8	4107.3	422.9
1974	6.1	2404.2	35.7	39.1	97.9	4.6	19.1	4.3	1 8	4104.9	432.1
1975	5.2	2426.5	36.1	39.8	101.5	4.8	18.8	3.9	1.9	4135.8	441.5
1976	7.9	2429.5	35.7	43.5	103.0	5.0	18.6	3.7	1.9	4137.8	447.4
1977	19.0	2432.0	35.9	26.0	101.7	5.3	18.8	3.7	2.0	3963.7	453.4
1978	30.3	2469.1	35.6	34.7	102.0	5.2	18.9	3.5	2.1	3760.5	459.6
1979	55.1	2457.8	35.2	33.7	102.2	5.1	18.9	3.5	2.2	3804.5	465.6
1980	100.6	2457.8	34.1	43.6	97.6	5.3	18.4	3.2	2.3	3787.6	471.5
1981	111.3	2425.2	33.1	44.6	100.	4.9	17.9	3.1	2.4	3818.9	465.1
1982	111.9	2448.5	32.7	119.1	98.5	4.8	17.1	2.8	2.5	3763.9	458.5
1983	120.8	2448.5	32.6	66.0	93.7	4.3	17.2	2.9	2.6	3811.5	429.4
1984	147.4	2468.6	32.4	76.4	95.7	4.0	17.7	2.9	2.6	3862.6	428.3
1985	127.8	2468.6	32.9	109.6	95.1	4.1	19.2	3.7	1.9	3856.9	412.5
1986	112.0	2468.6	31.9	80.8	95.0	4.2	17.7	4.0	2.1	3854.1	417.1
1987	121.2	2468.6	31.9	97.5	92.0	4.3	17.9	4.3	2.2	3938.3	410.3

Table B.2. Country - Drug

YR	TER	CAL	CBR	EPC	ETO	FPO	GAG	GCN	GMF	GMI	GMN	GUT	RRK	HYD
1970	0.7	2132	39.3	2.9	51.2	103	21.4	4.8	17.0	2.2	8.5	1.6	2986	260
1971	1.0	2132	39.1	3.2	47.8	102	20.9	4.9	17.4	2.5	8.2	1.6	2999	271
1972	1.0	2149	38.8	8.7	94.8	102	20.2	4.8	17.6	2.1	7.7	1.6	2934	281
1973	3.0	2164	39.2	5.7	72.9	104	19.4	4.8	17.7	2.2	7.7	1.6	2869	291
1974	2.0	2179	39.4	6.9	74.1	104	19.1	5.1	17.9	2.2	7.4	1.6	2869	302
1975	5.0	2196	39.6	4.2	44.9	107	19.2	5.2	18.2	2.7	6.4	1.6	2858	312
1976	8.3	2211	39.0	7.3	86.2	108	19.8	4.7	18.7	2.9	4.9	1.5	2849	314
1977	29.7	2226	38.9	7.2	64.4	104	19.1	4.7	18.5	2.5	5.9	1.5	2884	316
1978	60.0	2242	38.9	8.5	99.8	102	19.2	4.3	18.5	2.7	5.5	1.6	2744	317
1979	53.0	2242	38.3	7.1	87.1	102	19.0	4.3	18.7	2.3	5.7	1.5	2919	319
1980	83.0	2242	38.6	4.3	58.1	97	18.6	3.8	18.3	2.8	4.9	1.6	2943	321
1981	110.0	2251	38.8	3.3	54.8	101	18.9	3.9	17.7	2.7	4.6	1.7	3063	350
1982	204.0	2251	36.9	8.9	211.0	103	19.6	3.4	16.8	4.6	4.7	1.8	2832	344
1983	273.3	2251	37.3	5.8	65.3	88	18.2	3.3	16.1	5.1	5.1	1.9	3062	324
1984	270.0	2290	37.1	7.7	97.1	98	18.9	3.7	15.7	4.7	4.9	1.9	3014	290
1985	270.0	2290	35.3	5.9	95.1	98	16.1	3.6	19.5	4.7	9.5	0.5	3014	278
1986	323.0	2290	34.9	5.2	51.3	97	16.3	4.7	17.5	4.2	9.4	1.1	3015	275
1987	328.7	2290	34.9	5.1	53.9	96	17.5	4.7	17.8	4.2	9.8	1.1	3032	284

Table B.3. Country - Insurrection

YR	TER	CAL	CBR	ECD	ECO	EIN	GCF	GCN	GMF	GMN	GTC
1970	1.5	2159.3	42.6	192.5	14.2	169.8	21.1	7.7	16.7	0.6	5.3
1971	0.3	2159.3	43.2	212.8	12.1	200.5	20.9	7.6	16.9	0.6	5.3
1972	0.5	2126.5	43.9	232.3	11.4	229.8	20.6	7.6	16.8	0.7	5.4
1973	1.0	2126.5	41.4	231.3	18.1	237.3	20.9	7.9	17.5	0.6	5.5
1974	0.8	2126.5	43.6	260.8	16.9	250.8	21.2	8.0	17.3	0.7	5.5
1975	4.0	2159.3	44.4	264.8	24.7	263.0	21.0	8.2	17.4	0.6	5.4
1976	6.3	2159.3	42.8	288.0	24.5	298.3	21.2	8.9	17.2	0.4	5.8
1977	5.0	2157.3	44.6	319.8	19.5	379.5	21.5	9.1	17.3	0.5	5.9
1978	55.0	2188.0	43.7	327.3	13.3	402.5	21.3	8.8	17.2	0.6	5.8
1979	149.0	2145.5	43.8	310.8	21.2	405.5	20.2	7.7	16.0	0.7	5.8
1980	297.3	2145.5	40.6	294.5	44.3	413.5	20.1	7.9	16.6	1.1	6.4
1981	320.3	2168.8	38.3	291.0	57.6	421.8	20.9	7.7	16.4	1.2	6.2
1982	255.5	2256.0	38.2	295.0	71 3	404.8	21.4	7.5	15.5	1.2	5.8
1983	209.8	2256.0	37.9	304.3	95.3	467.5	21.5	7.3	15.6	1.2	5.8
1984	168.0	2266.5	37.3	303.3	82.9	480.5	21.5	7.1	15.3	1.5	6.1
1985	195.0	2266.5	41.4	301.3	193.0	489.0	21.9	7.1	15.9	1.4	5.1
1986	104.5	2266.5	39.7	292.8	144.1	490.0	22.1	6.9	15.8	1.4	5.3
1987	135.3	2266.5	39.7	292.8	212.2	491.3	22.2	7.0	16.2	1.5	5.3

Appendix C. Rotated Factor Patterns

Run 1. Represents FA performed only on the Socio-Economic Variables.

Run 2. Represents FA performed on Socio-Economic Factors and Terrorism Combined.

Table C.1. FA for Argentina

Run 1		
f1	f2	f3
CBR	EAP	- CAL
GAG	FPO	ETO
GCN	GTC	GMI
	GTO	- HYD

Run 2			
f1	f2	f3	f4
CAL	FPO	ETO	TER
CBR	GTO	GAG	HYD
- EAP		GTC	
GCN			
- GMI			

Table C.2. FA for Bolivia

Run 1	
f1	f2
CAL	GMF
- CBR	GTC
ECD	- GUT
ETO	
- FPO	
GAG	
GMI	

Run 2		
f1	f2	f3
CAL	ECD	TER
- CBR	GMF	- FPO
ETO	GTC	GMI
GAG		
- GUT		

Table C.3. FA for Chile

Run 1			
f1	f2	f3	f4
FPO	- CBR	CAL	- GAG
GCN	EAP	- ETO	GTC
- GMN	RDK	GCF	
GTO			
RRK			

Run 2			
f1	f2	f3	f4
TER	FPO	- ETO	GAG
- CAL	GCN	GCF	- GTC
- CBR	- GMN	GTO	
EAP	RRK		
RDK			

Table C.4. FA for Colombia

Run 1		
f1	f2	f3
- CBR	CAL	ETO
GMF	FPO	- RRK
GMI	GTC	
GMN	HYD	
- GUT		

Run 2		
f1	f2	f3
- CBR	TER	ETO
GMF	CAL	- RRK
GMI	FPO	
GMN	GTC	
- GUT	HYD	

Table C.5. FA for Costa Rica

Run 1		
f1	f2	f3
CAL	ETO	GTC
- CBR	- FPO	RRK
- GAG	- GCN	
GMI	GUT	
GMN		

Run 2		
f1	f2	f3
ETO	CAL	TER
- FPO	- CBR	GTC
- GCN	- GAG	RRK
GUT	GMI	
	GMN	

Table C.6. FA for Ecuador

Run 1		
f1	f2	f3
- CBR	CAL	- GCN
EAP	FPO	GMF
ETO	- GCF	
- GMI	GUT	
GMN	RRK	
- IMR		

Run 2		
f1	f2	f3
TER	CAL	-GCN
EAP	FPO	GMF
ETO	- GCF	
- GMI	GUT	
GMN	RRK	
- IMR		
- CBR		

Table C.7. FA for El Salvador

Run 1		
f1	f2	f3
- ETO	ECD	CAL
FPO	- GAG	CBR
- GMI	GCN	
GTC	- GMN	

Run 2		
f1	f2	f3
- ETO	CAL	- TER
FPO	ECD	CBR
- GMI	- GAG	
GTC	GCN	
	- GMN	

Table C.8. FA for Guatemala

Run 1	
f1	f2
CAL	ECD
- CBR	FPO
EPC	- GAG
ETO	GMN
GMF	GTC
- HYD	

Run 2		
f1	f2	f3
CAL	ECD	TER
- CBR	FPO	GMN
EPC	- GAG	
ETO	GTC	
GMF		
- HYD		

Table C.9. FA for Honduras

Run 1			
f1	f2	f3	f4
CBR	GCF	GMF	- CAL
- EAP	GCN	GTC	GMN
FPO			
GAG			
HYD			

Run 2			
f1	f2	f3	f4
CBR	TER	GCF	GMF
- EAP	CAL	GCN	GTC
FPO	GMN		
GAG			
HYD			

Table C.10. FA for Nicaragua

Run 1			
f1	f2	f3	f4
CAL	ECD	CBR	GTC
GCF	EPD	ETO	
GCN	- GMN	FPO	
- GUT	RDK	GAG	
- RRK		- GMF	

Run 2				
f1	f2	f3	f4	f5
- CAL	- TER	ECD	CBR	- GMF
ETO	GCF	EPD	FPO	GTC
GUT	GCN	- GMN	GAG	
RRK		RDK		

Table C.11. FA for Panama

Run 1	
f1	f2
CBR	CAL
- EAP	ETO
FPO	GCF
GMN	- GCN
HYD	

Run 2	
f1	f2
- TER	CAL
CBR	ETO
- EAP	GCF
FPO	
GCN	
GMN	
HYD	

Table C.12. FA for Paraguay

Run 1	
f1	f2
CAL	ETO
- CBR	GCF
EAP	GTC
FPO	
- GAG	
- GMI	

Run 2	
f1	f2
CAL	- TER
- CBR	ETO
EAP	GCF
FPO	GTC
- GAG	
- GMI	

Table C.13. FA for Peru

Run 1		
f1	f2	f3
- CBR	- CAL	- GMF
EAP	ETO	GUT
- GCN	GTC	
GMI		
GMN		
RRK		
- HYD		

Run 2			
f1	f2	f3	f4
TER	- CAL	GCN	- RRK
- CBR	ETO	- GMF	
EAP	GTC	GUT	
GMI			
GMN			
- HYD			

Table C.14. FA for Uruguay

Run 1		
f1	f2	f3
CAL	- ETO	- FPO
- EPD	- GAG	GMF
GMN	GCN	
GTC	GTO	
- RDK		

Run 2			
f1	f2	f3	f4
CAL	TER	- GAG	- FPO
- EPD	ETO	GCN	GMF
GMN	- RDK	GTO	
GTC			

Table C.15. FA for Venezuela

Run 1	
f1	f2
CBR	CAL
- EAP	- GAG
ETO	GTO
FPO	GUT
GCN	
- GMI	

Run 2	
f1	f2
- TER	CAL
CBR	- GAG
- EAP	GTO
ETO	GUT
FPO	
GCN	
- GMI	

Appendix D. Linear Models

Composite Country

LS Regression Model: $TER = 883.79 + 0.39 * CAL - 42.01 * CBR - 0.36 * ETO - 40.45 * GMN$

$-85.75 * GUT$

R-square is 0.9876, Adjusted R-sq is 0.9824 and d is 2.48.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	883.787311	271.06530046	3.260	0.0068
CAL	1	0.398179	0.10092787	3.945	0.0019
CBR	1	-42.006883	3.62530848	-11.587	0.0001
ETO	1	-0.360315	0.12457445	-2.892	0.0135
GMN	1	-40.445502	6.61451894	-6.115	0.0001
GUT	1	-85.745123	21.02363089	-4.079	0.0015

FA Regression Model: $TER = 60.26 - 52.14 * f1 - 15.94 * f2$

$d(FA) = 1.33$

Drug Group

LS Regression Model: $TER = -360.81 + 0.88 * CAL - 29.19 * CBR - 0.26 * ETO - 20.07 * GCN$

$-33.51 * GMF + 23.96 * GMI + 16.03 * GMN + 0.51 * HYD$

R-square is 0.9985, Adjusted R-sq is 0.9971 and d is 3.46.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-360.813628	464.18119452	-0.777	0.4569
CAL	1	0.875850	0.11889022	7.367	0.0001
CBR	1	-29.195519	5.60673242	-5.207	0.0006
ETO	1	-0.263238	0.06138160	-4.289	0.0020
GCN	1	-20.076458	5.12531063	-3.917	0.0035
GMF	1	-33.512657	2.72081330	-12.317	0.0001
GMI	1	23.975852	4.42976388	5.412	0.0004
GMN	1	16.029328	3.67077036	4.367	0.0018
HYD	1	0.511198	0.13994853	3.653	0.0053

FA Regression Model: $TER = 112.54 - 120.75 * f1 - 19.92 * f2 + 3.92 * f3 - 19.49 * f4$

$d(FA) = 1.81$

Insurrection Group

LS Regression Model: $TER = 5624.24 - 30.59 * CBR - 208.32 * GCF + 251.77 * GCN$

$-60.03 * GMF + 468.59 * GMN - 216.23 * GTC$

R-square is 0.9031, Adjusted R-sq is 0.8503 and d is 2.04.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	5624.244426	2078.6492912	2.706	0.0204
CBR	1	-30.596819	14.23963442	-2.149	0.0548
GCF	1	-208.322286	64.60315906	-3.225	0.0081
GCN	1	251.773331	96.14400953	2.619	0.0239
GMF	1	-60.030905	34.21010919	-1.755	0.1071
GMN	1	468.597336	115.83944623	4.045	0.0019
GTC	1	-216.225691	131.14525088	-1.649	0.1274

FA Regression Model: $TER = 106.04 - 79.45 * f1 - 22.99 * f2 + 57.98 * f3$

$d(FA) = 2.24$

Argentina

LS Regression Model: $TER = 73.55 - 0.19 * CAL + 0.24 * ETO + 8.24 * GAG - 18.63 * GNC$

$-39.57 * GMI - 12.86 * GTC + .004 * GTO + 0.51 * HYD$

R-square is 0.7760, Adjusted R-sq is 0.5768 and d is 1.93.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	73.545346	306.61152494	0.240	0.8158
CAL	1	-0.194099	0.09645305	-2.012	0.0750
ETO	1	0.243357	0.07976506	3.051	0.0138
GAG	1	8.239961	5.21037942	1.581	0.1482
GCN	1	-18.627803	5.09017473	-3.660	0.0052
GMI	1	-39.570904	12.42504096	-3.185	0.0111
GTC	1	-12.863348	5.23869419	-2.455	0.0364
GTO	1	0.003617	0.00138056	2.620	0.0278
HYD	1	0.508196	0.19653277	2.586	0.0294

FA Regression Model: $TER = 33.17 - 10.42 * f1 - 4.77 * f2 - 7.58 * f3$

$d(FA) = 1.59$

Bolivia

LS Regression Model: $TER = 34.02 + 0.18 * ECD - 0.15 * ETO - 0.62 * FPO$

R-square is 0.6395, Adjusted R-sq is 0.5623 and d is 3.12.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	34.016126	28.66454452	1.187	0.2551
ECD	1	0.184206	0.04518755	4.076	0.0011
ETO	1	-0.147977	0.07642678	-1.936	0.0733
FPO	1	-0.617810	0.24728174	-2.498	0.0255

FA Regression Model: $TER = 8.99 + 5.78 * f1 + 4.18 * f2$

$d(FA) = 2.32$

Chile

LS Regression Model: $TER = 5476.8 - 135.20 * CBR - 2.11 * ETO + 24.17 * FPO - 365.63 * GAG$

$$-124.63 * GCF + 34.25 * GTC - 0.06 * GTO + 0.26 * RRK$$

R-square is 0.8308, Adjusted R-sq is 0.6805 and d is 2.7.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	5476.857374	1473.3945657	3.717	0.0048
CBR	1	-135.202513	29.08132614	-4.649	0.0012
ETO	1	-2.109124	0.87062180	-2.423	0.0384
FPO	1	24.171022	7.42289857	3.256	0.0099
GAG	1	-365.624003	83.89307314	-4.358	0.0018
GCF	1	-124.627183	34.32759762	-3.631	0.0055
GTC	1	34.252059	29.89252830	1.146	0.2814
GTO	1	-0.058353	0.02164204	-2.696	0.0245
RRK	1	0.263038	0.08206410	3.205	0.0107

FA Regression Model: $TER = 90.39 + 45.26 * f1 + 96.30 * f2 - 11.62 * f3 + 41.89 * f4$

$d(FA) = 1.58$

Colombia

LS Regression Model: $TER = -649.0 + 0.72 * CAL - 25.74 * CBR + 32.34 * GMI - 0.55 * HYD$

R-square is 0.9966, Adjusted R-sq is 0.9694 and d is 2.19.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-649.003369	235.59737802	-2.755	0.0164
CAL	1	0.718916	0.08063300	8.916	0.0001
CBR	1	-25.739711	4.59601030	-5.600	0.0001
GMI	1	32.338013	11.65318341	2.775	0.0158
HYD	1	-0.554678	0.31360099	-1.769	0.1004

FA Regression Model: $TER = 142.72 + 84.0 * f1 + 96.91 * f2 + 21.13 * f3$

$d(FA) = 1.64$

Costa Rica

LS Regression Model: $TER = 39.74 - 0.03 * CAL + 0.02 * ETO + 61.58 * GMN + 0.02 * RRK$

R-square is 0.7711, Adjusted R-sq is 0.7006 and d is 2.29.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	39.736878	15.32383707	2.593	0.0223
CAL	1	-0.028950	0.00711949	-4.066	0.0013
ETO	1	0.022580	0.00837520	2.696	0.0183
GMN	1	61.576916	15.48117735	3.978	0.0016
RRK	1	0.019871	0.00932202	2.132	0.0527

FA Regression Model: $TER = 2.33 + 0.8 * f1 + 0.53 * f2 + 1.52 * f3$

$d(FA) = 2.1$

Ecuador

LS Regression Models: $TER = 128.75 - 0.06 * CAL + 0.02 * EAP - 0.35 * FPO - 1.7 * GCF$

$+0.49 * GMF + 5.28 * GMI$

R-square is 0.8014, Adjusted R-sq is 0.6931 and d is 2.92.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	128.753573	62.38601994	2.064	0.0634
CAL	1	-0.064295	0.02793591	-2.302	0.0419
EAP	1	0.018032	0.00313182	5.758	0.0001
FPO	1	-0.346888	0.14581681	-2.379	0.0366
GCF	1	-1.702577	0.75411966	-2.258	0.0453
GMF	1	0.486400	0.15520355	3.134	0.0095
GMI	1	5.277900	2.99153846	1.764	0.1054

FA Regression Model: $TER = 4.83 + 2.87 * f1 + 1.78 * f2 + 1.84 * f3$

$d(FA) = 1.28$

El Salvador

LS Regression Model: $TER = 3716.07 - 1.39 * CAL - 35.26 * CBR + 2.52 * ECD$

$+75.12 * GMI - 1505.22 * GMN$

R-square is 0.9224, Adjusted R-sq is 0.8901 and d is 2.37.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	3716.076011	708.39584389	5.246	0.0002
CAL	1	-1.387731	0.43466961	-3.193	0.0077
CBR	1	-35.255392	4.01340660	-8.784	0.0001
ECD	1	2.522650	1.21786717	2.071	0.0605
GMI	1	75.115582	20.75481521	3.619	0.0035
GMN	1	-1505.223008	631.94707078	-2.382	0.0346

FA Regression Model: $TER = 228.89 - 39.37 * f1 + 57.43 * f2 - 202.03 * f3$

$d(FA) = 1.19$

Guatemala

LS Regression Model: $TER = 2146.65 - 0.72 * CAL + 43.41 * CBR - 1.24 * ECD$

$$-49.01 * GAG - 62.08 * GMF + 1133.39 * GMN$$

R-square is 0.8941, Adjusted R-sq is 0.8363 and d is 2.26.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	2146.645430	1650.7882231	1.300	0.2201
CAL	1	-0.722930	0.38163481	-1.894	0.0848
CBR	1	43.414293	15.93868125	2.724	0.0198
ECD	1	-1.246088	0.75966992	-1.640	0.1292
GAG	1	-49.010705	20.59256068	-2.380	0.0365
GMF	1	-62.081042	24.00753984	-2.586	0.0253
GMN	1	1133.398518	212.29096540	5.339	0.0002

FA Regression Model: $TER = 88.5 - 25.39 * f1 + 84.09 * f2$

$d(FA) = 0.75$

Honduras

LS Regression Model: $TER = -189.57 + 0.15 * CAL + 0.06 * EAP + 0.58 * FPO - 1.96 * GAG$

$$-7.27 * GCF - 7.88 * GTC$$

R-square is 0.8432, Adjusted R-sq is 0.7576 and d is 1.5.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-189.571201	108.96646902	-1.740	0.1098
CAL	1	0.148124	0.04271334	3.468	0.0053
EAP	1	0.063131	0.01928345	3.274	0.0074
FPO	1	0.577843	0.31600166	1.829	0.0947
GAG	1	-1.960670	1.13626052	-1.726	0.1124
GCF	1	-7.270998	2.72275204	-2.670	0.0218
GTC	1	-7.881449	3.05783358	-2.577	0.0257

FA Regression Model: $TER = 8.72 - 5.12 * f1 - 1.52 * f2 + 2.56 * f3 - 4.94 * f4$

$d(FA) = 1.34$

Nicaragua

LS Regression Model: $TER = -855.07 + 1.17 * ECD - 1.55 * EPD - 1.93 * ETO - 6.95 * FPO$

$+21.89 * GAG - 58.04 * GCF + 93.81 * GCN - 335.62 * GMN - 153.05 * GTC - 54.51 * CUT$

R-square is 0.9888, Adjusted R-sq is 0.9620 and d is 2.95.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-855.072641	778.54718976	-1.098	0.3221
ECD	1	1.170444	0.46307452	2.528	0.0527
EPD	1	-1.555479	0.43252452	-3.596	0.0156
ETO	1	-1.934084	0.79248782	-2.441	0.0586
FPO	1	-6.948127	1.89278312	-3.671	0.0144
GAG	1	21.890722	8.14046737	2.689	0.0433
GCF	1	-58.044295	12.88461095	-4.505	0.0064
GCN	1	93.808658	32.48536528	2.888	0.0343
GMN	1	-335.624475	140.64775202	-2.386	0.0627
GTC	1	-153.051129	48.87881737	-3.131	0.0259
GUT	1	-54.507034	22.07633792	-2.469	0.0566
RDK	1	0.032707	0.01332278	2.455	0.0576
RRK	1	10.595184	2.77414919	3.819	0.0124

FA Regression Model: $TER = 98.06 - 65.27 * f1 - 10.53 * f2 - 68.21 * f3 - 15.22 * f4$

$d(FA) = 1.67$

Panama

LS Regression Model: $TER = -6.22 - 0.03 * CAL + 0.26 * CBR + 0.06 * EAP$

$+1.81 * GCF + 32.35 * GMN$

R-square is 0.8160, Adjusted R-sq is 0.7394 and d is 2.23.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-6.221734	15.71497369	-0.396	0.6991
CAL	1	-0.029521	0.00911042	-3.240	0.0071
CBR	1	0.264267	0.16074511	1.644	0.1261
EAP	1	0.058912	0.01023419	5.756	0.0001
GCF	1	1.810202	0.75218118	2.407	0.03[illegible]
GMN	1	32.346017	7.52262356	4.300	0.0010

FA Regression Models: $TER = 1.94 - 1.59 * f1 - 0.73 * f2$

$d(FA) = 2.85$

Paraguay

LS Regression Model: $TER = 5.01 + 0.006 * CAL - 1.06 * GCF$

R-square is 0.4604, Adjusted R-sq is 0.3885 and d is 2.48.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	5.007482	8.23741892	0.608	0.5524
CAL	1	0.005862	0.00270304	2.169	0.0466
GCF	1	-1.061381	0.31492907	-3.370	0.0042

FA Regression Model: $TER = 0.5 + 0.17 * f1 - 0.21 * f2$

$d(FA) = 2.56$

Peru

LS Regression Model: $TER = 2311.53 - 27.41 * CBR + 0.33 * EAP - 30.09 * GCN$

$$-63.92 * GMF - 28.09 * GMN - 233.98 * GTC + 1.61 * HYD$$

R-square is 0.9907, Adjusted R-sq is 0.9842 and d is 2.80.

Variable	DF	Estimate	Std Error	T for HO: Param=0	*Prob* > |*T*|
INTERCEP	1	2311.532231	430.34729933	5.371	0.0003
CBR	1	-27.406761	7.11352205	-3.853	0.0032
EAP	1	0.330699	0.04139961	7.988	0.0001
GCN	1	-30.099462	11.95873976	-2.517	0.0305
GMF	1	-63.923595	6.78737814	-9.418	0.0001
GMN	1	-28.099535	7.56378176	-3.715	0.0040
GTC	1	-233.981157	35.93193503	-6.512	0.0001
HYD	1	1.609895	0.85847435	1.875	0.0902

FA Regression Model: $TER = 185.89 + 228.15 * f1 + 36.45 * f2 + 35.58 * f3$

$d(FA) = 0.75$

Uruguay

LS Regression Model: $TER = 273.99 + 0.13 * FPO - 3.61 * GTC - 0.005 * RDK$

R-square is 0.9607, Adjusted R-sq is 0.9523 and d is 2.01.

Variable	DF	Estimate	Std Error	T for HO: Param=0	*Prob* > |*T*|
INTERCEP	1	273.994079	20.03016029	13.679	0.0001
FPO	1	0.131788	0.07583227	1.738	0.1042
GTC	1	-3.607940	0.52871157	-6.824	0.0001
RDK	1	-0.005097	0.00028904	-17.633	0.0001

FA Regression Model: $TER = 3.94 + 4.37 * f1 - 6.1 * f2 - 3.85 * f3$

$d(FA) = 0.73$

Venezuela

LS Regression Model: $TER = -2.78 + 0.002 * EAP$

R-square is 0.2566, Adjusted R-sq is 0.2101 and d is 2.23.

Variable	DF	Estimate	Std Error	T for HO: Param=0	$Prob > \|T\|$
INTERCEP	1	-2.788220	3.41444783	-0.817	0.4262
EAP	1	0.001706	0.00072586	2.350	0.0319

FA Regression Model: $TER = 5.06 - 1.16 * f1 + 0.88 * f2$

$d(LS) = 2.23$ $d(FA) = 2.01$

Appendix E. Plots of Linear Models

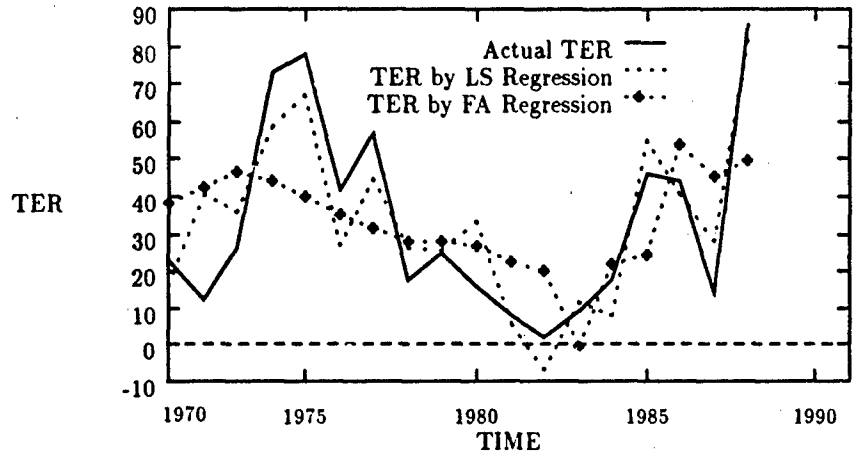


Figure E.1. TER Models for Argentina

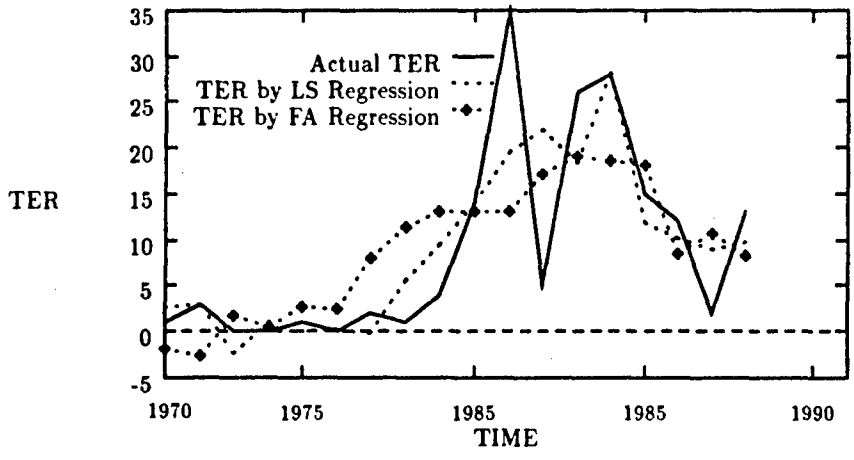


Figure E.2. TER Models for Bolivia

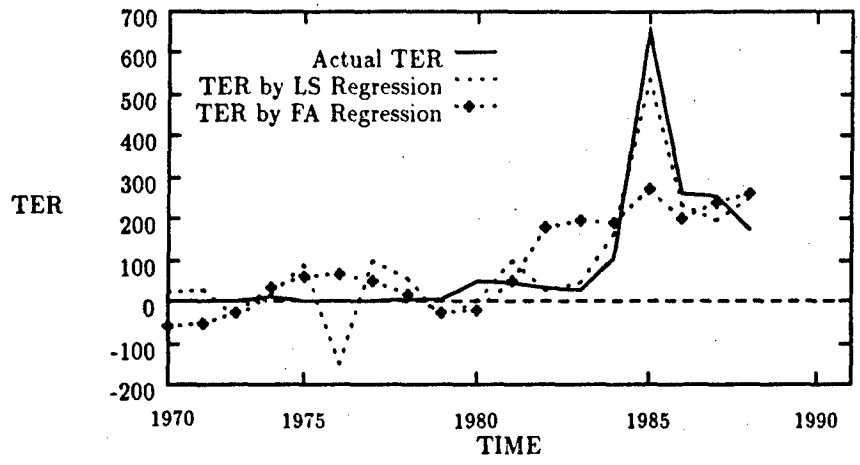


Figure E.3. TER Models for Chile

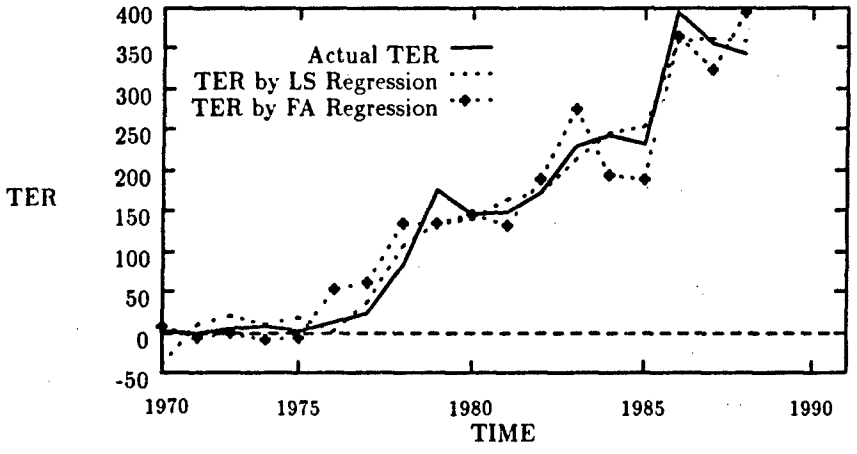


Figure E.4. TER Models for Colombia

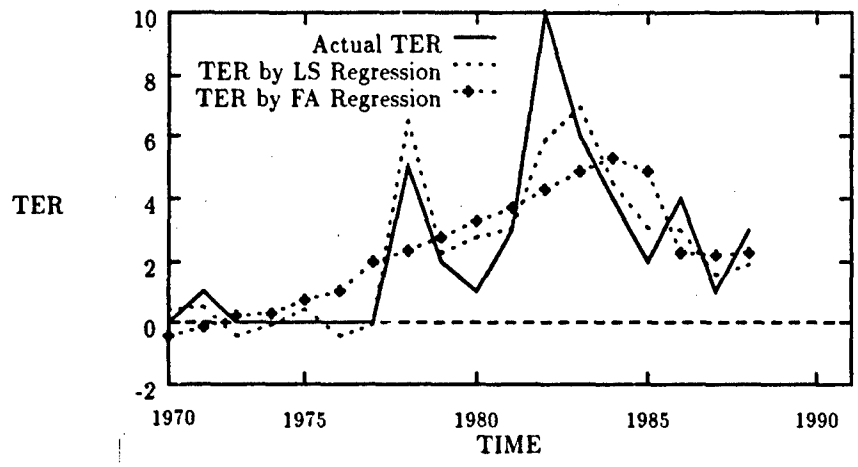


Figure E.5. TER Models for Costa Rica

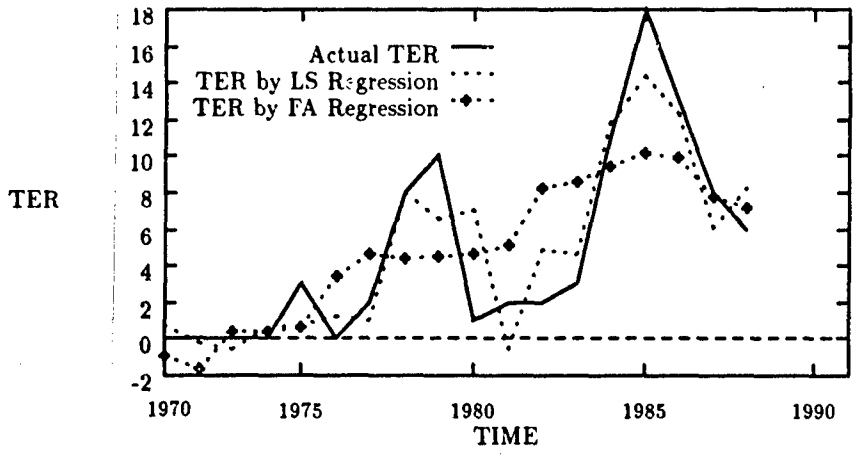


Figure E.6. TER Models for Ecuador

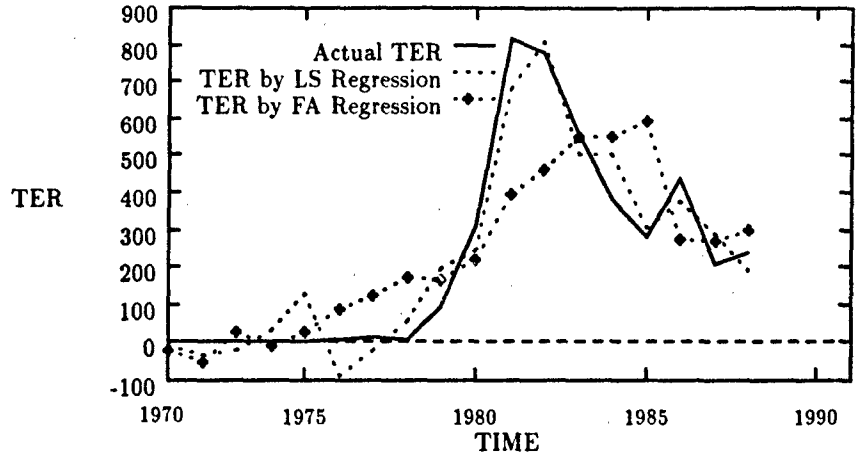


Figure E.7. TER Models for El Salvador

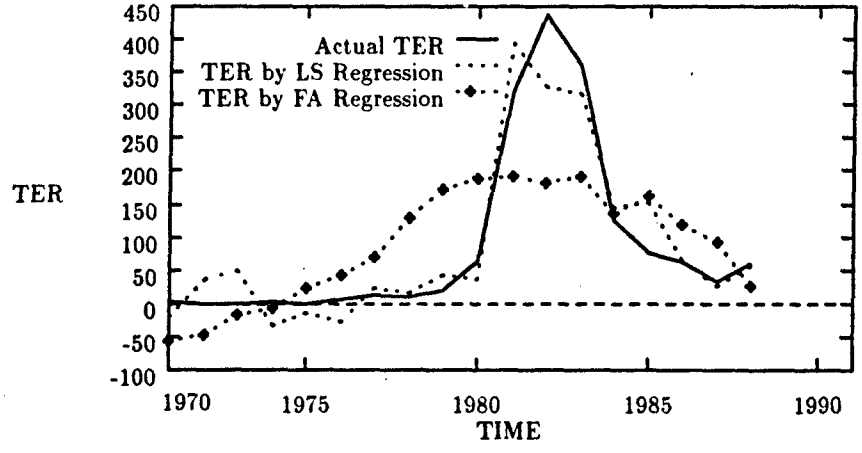


Figure E.8. TER Models for Guatemala

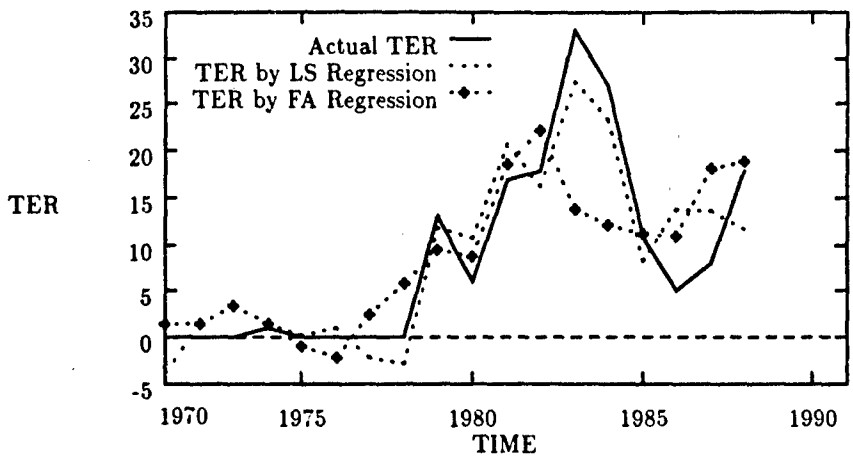


Figure E.9. TER Models for H. dura:

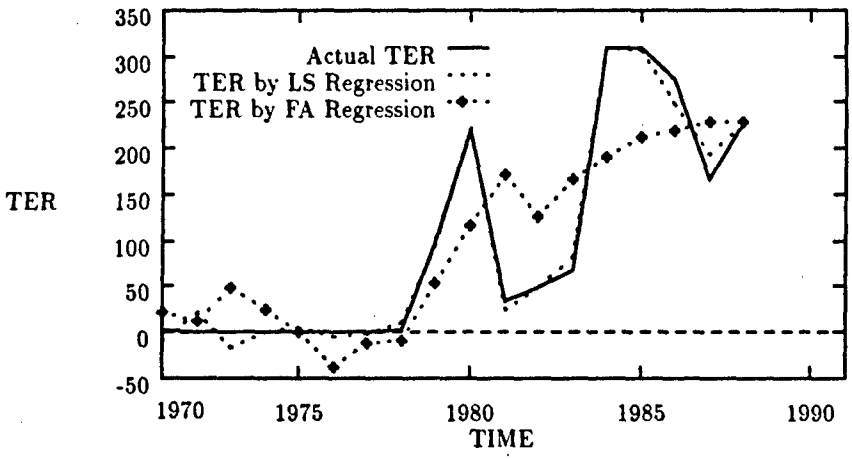


Figure E.10. TER Models for Nicaragua

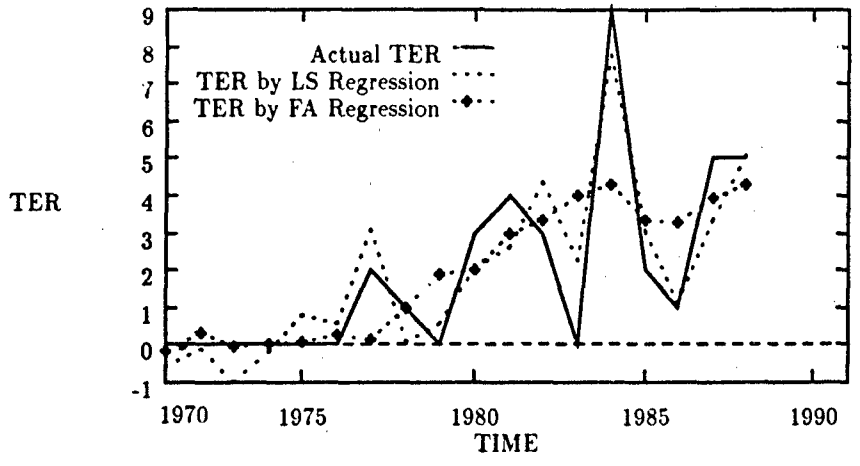


Figure E.11. TER Models for Panama

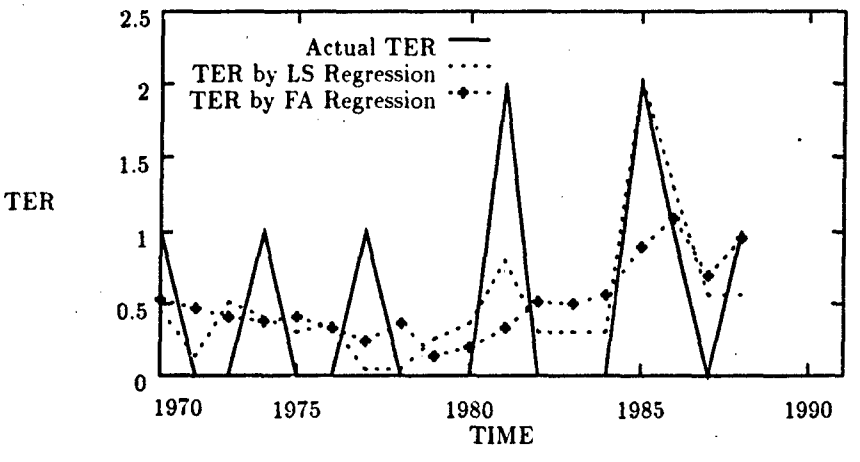


Figure E.12. TER Models for Paraguay

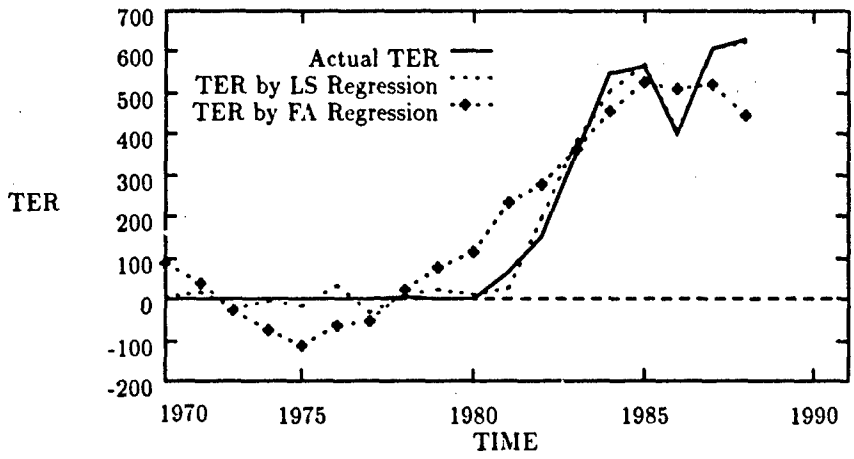


Figure ..13. TER Models for Peru

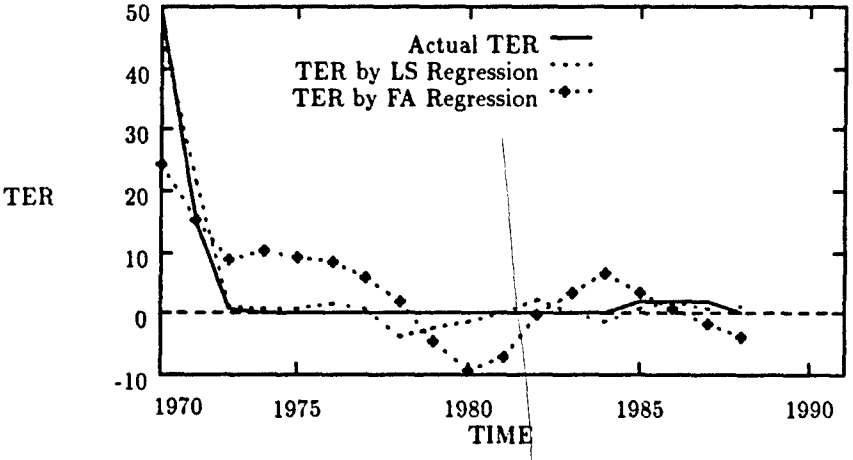


Figure E.14. TER Models for Uruguay

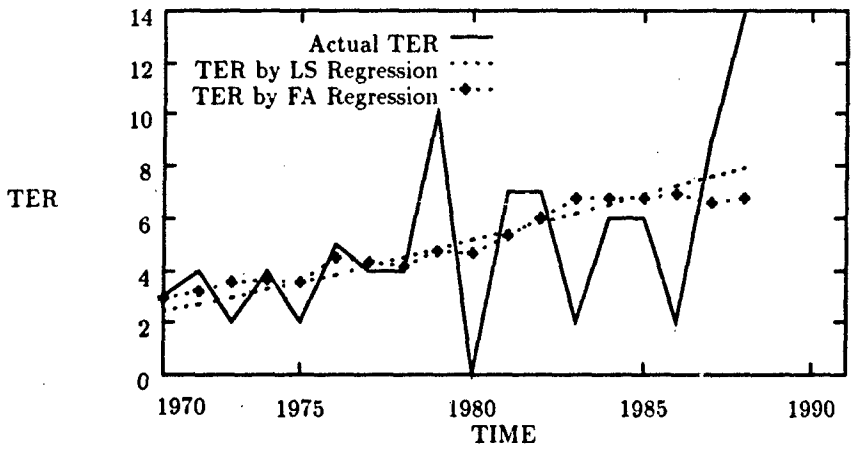


Figure E.15. TER Models for Venezuela

Appendix F. Residual Plots

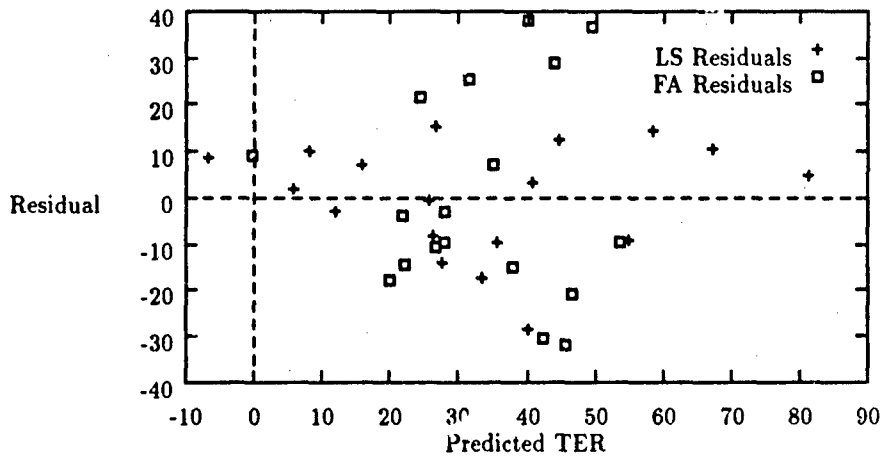


Figure F.1. Residual Plots for Argentina

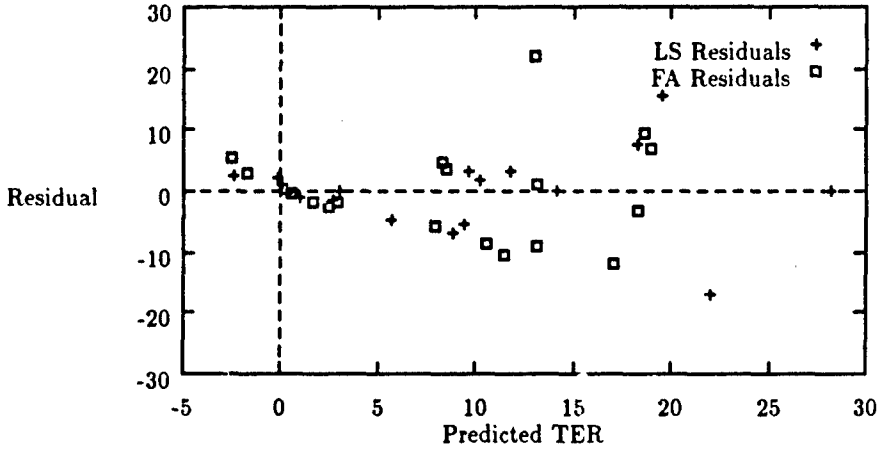


Figure F.2. Residual Plots for Bolivia

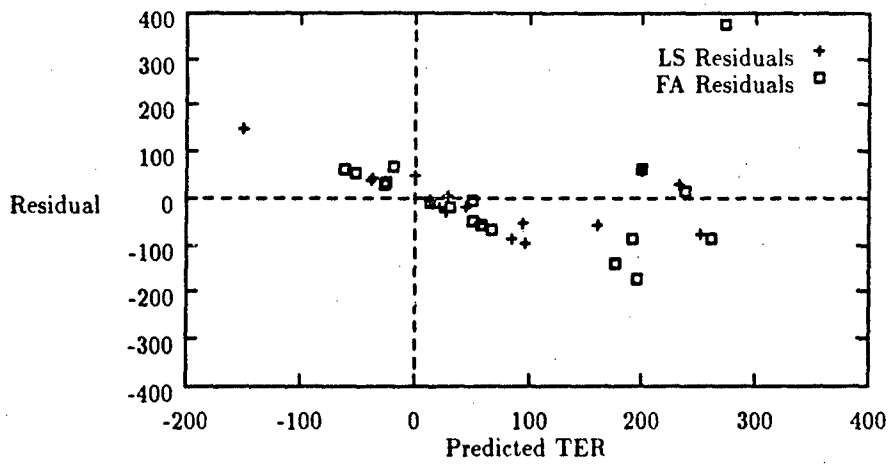


Figure F.3. Residual Plots for Chile

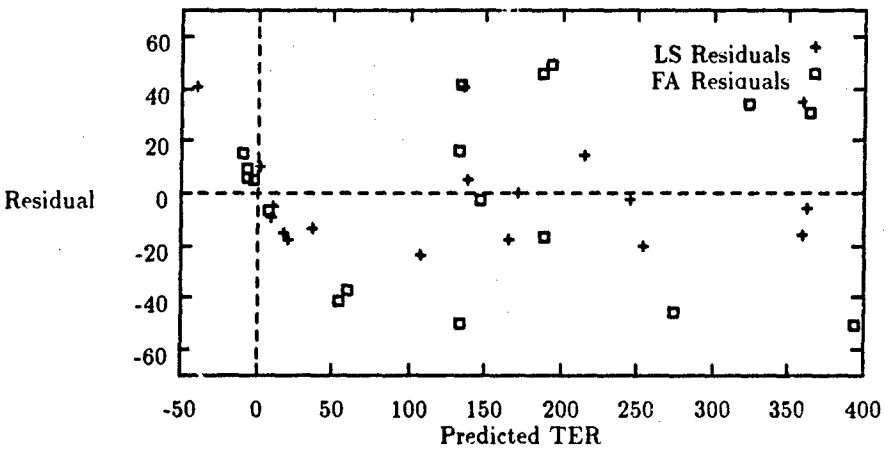


Figure F.4. Residual Plots for Colombia

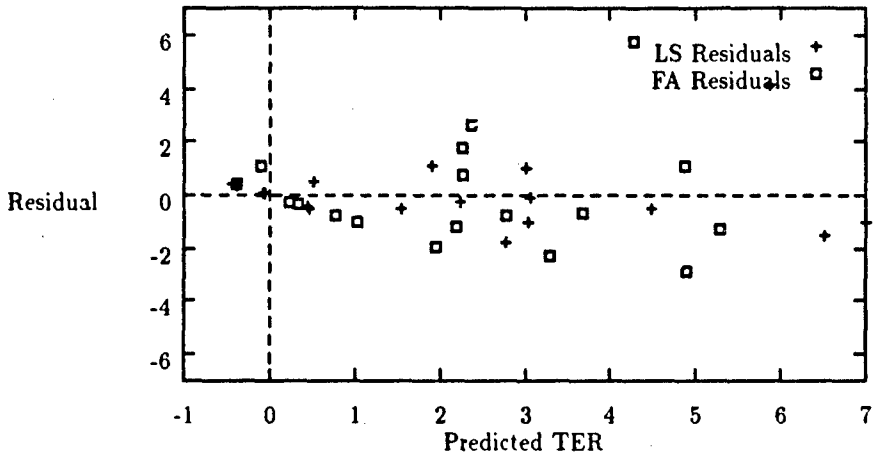


Figure F.5. Residual Plots for Costa Rica

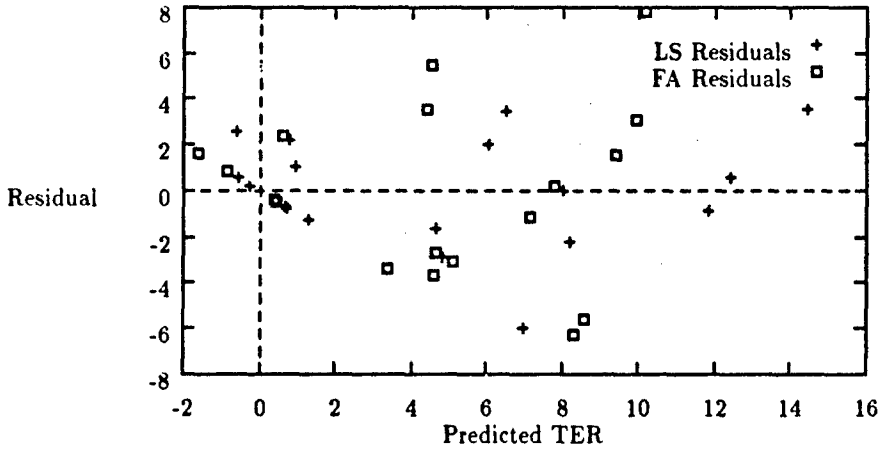


Figure F.6. Residual Plots for Ecuador

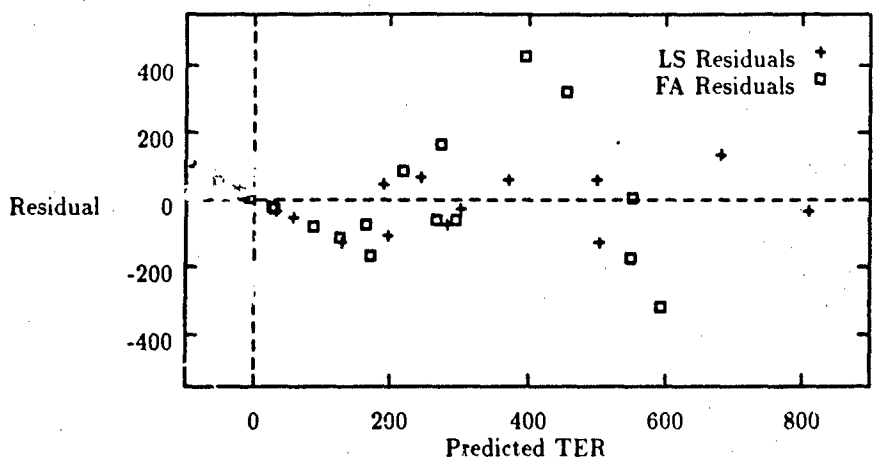


Figure F.7. Residual Plots for El Salvador

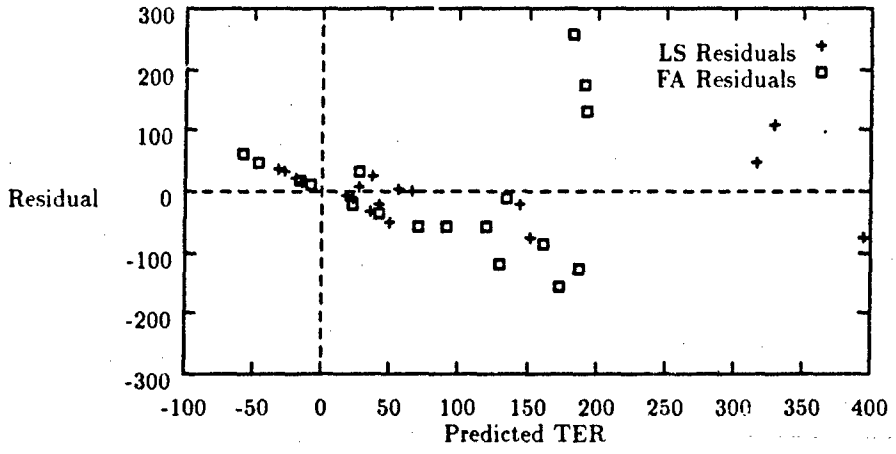


Figure F.8. Residual Plots for Guatemala

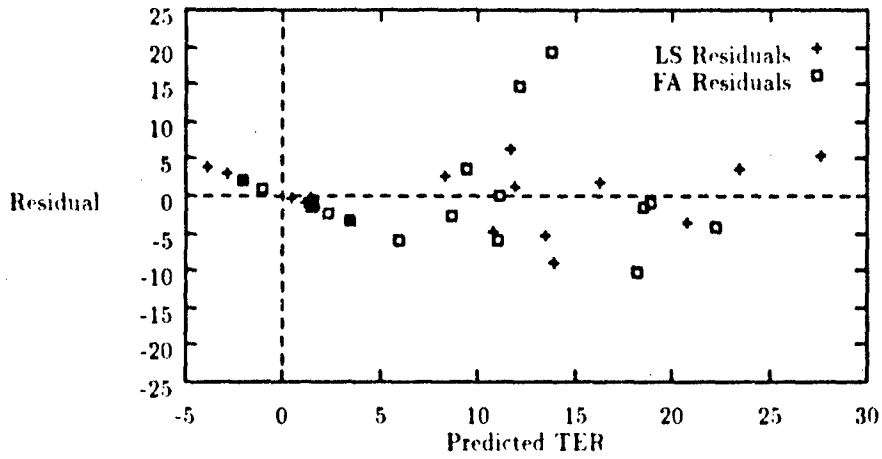


Figure F.9. Residual Plots for Honduras

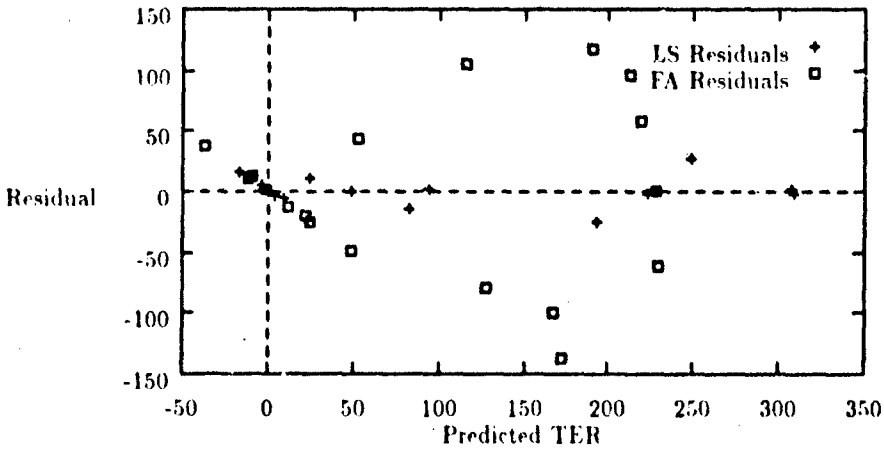


Figure F.10. Residual Plots for Nicaragua

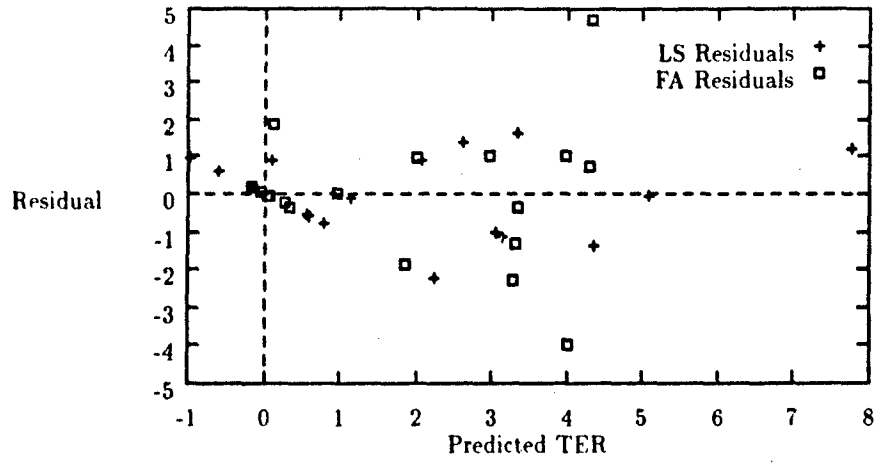


Figure F.11. Residual Plots for Panama

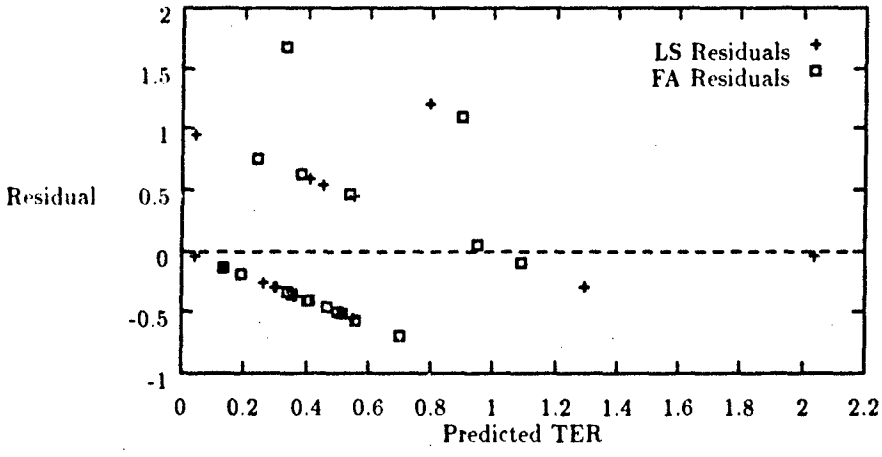


Figure F.12. Residual Plots for Paraguay

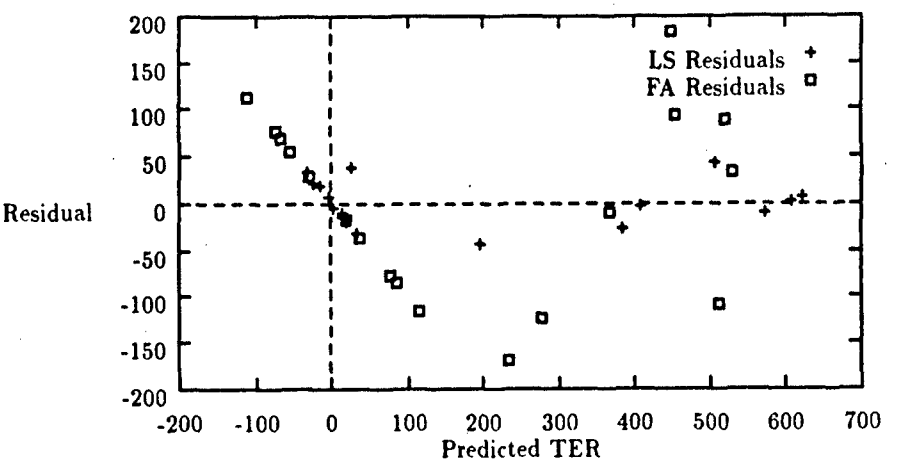


Figure F.13. Residual Plots for Peru

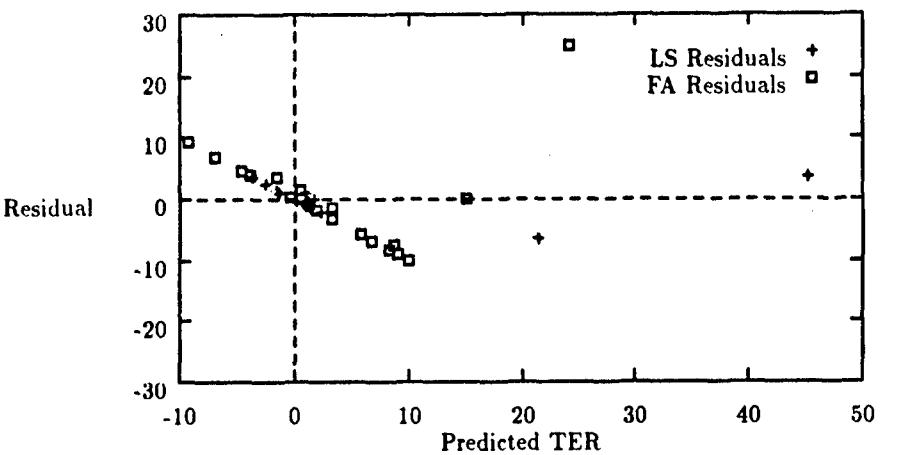


Figure F.14. Residual Plots for Uruguay

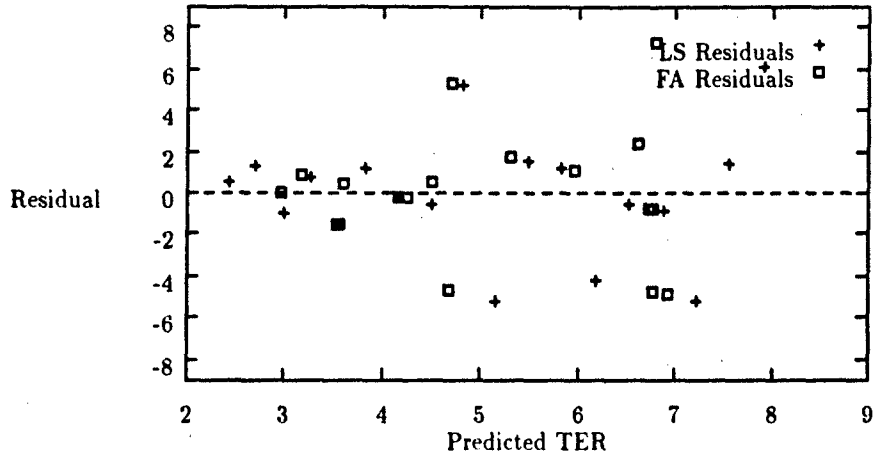


Figure F.15. Residual Plots for Venezuela

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Vita

Juan A. Hurtado was born on 27 December 1959 in Guayaquil, Ecuador. He graduated from the La Salle (Ecuador) High School in 1977 and entered the Polytechnic Institute of New York where he received a Bachelor of Science in Aerospace Engineering in 1982. He earned his commission from the Air Force Officer Training School in 1982. His first assignment was to Wright Patterson AFB, OH where he worked as an Aerospace Engineer in the Acquisition Logistics Center from November 1982 to May 1986; and, as Chief Supportability Engineer in the Flight Dynamics Laboratory until September 1988. Then, he served as a Liaison Officer for the Joint Task Force-Bravo, US Military Group and US Embassy in Honduras from January 1989 to January 1990. Later, he was assigned as Chief Experimental Operations Branch at the Astronautics Laboratory at Edwards AFB, CA from January 1990 until December 1990. He then became the Deputy Director for the Experimental Operations Directorate for the Phillips Laboratory at Edwards AFB, CA from December 1990 until entering the School of Engineering, Air Force Institute of Technology in August 1991.

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March 1993 Master's Thesis

A STATISTICAL ANALYSIS OF TERRORISM AND INSTABILITY IN LATIN AMERICA

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Air Force Institute of Technology, WPAFB OH 45433-6583

AFIT/GOR/ENS/93M-10

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Distribution Unlimited

Abstract

In this research the effect of socio-economic factors on terrorism and government instability in Latin America are studied. A commonly held opinion is that terrorism and instability are caused by repressive conditions. The objective of this research was to generate a methodology to forecast terrorism and instability given certain socio-economic indicators. This methodology was generated for individual countries, two groups of countries, and a composite developing country A set of 28 socio-economic factors were evaluated and reduced based on correlation analysis. Patterns of terrorism and instability were investigated through data analysis and factor analysis. Multiple regression was used to develop predictive models. Although autocorrelation was present in most of the models, all terrorism trends except in the individual country models of Paraguay and Venezuela were fairly well fitted by the models. Similar results were observed in modelling the trend of instability generated for Argentina. Data analysis showed that there was a correlation between terrorism and some socio-economic factors. Generally, countries having a relative high level of standard of living experienced less terrorism.

Terrorism, Instability, Factor Analysis, Linear Regression 240

17. Security Classification of Report			
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL